

System User's Guide for the SIMSS/PM-1 Simulator

**Release 6.0
September 2000**

Prepared Under Contract NAS9-98100
by Computer Sciences Corporation

System User's Guide for the SIMSS/PM-1 Simulator

**Release 6.0
September 2000**

Prepared Under Contract NAS9-98100
by Computer Sciences Corporation

System User's Guide
for the
SIMSS/PM-1 Simulator

Release 6.0
September 2000

Prepared Under Contract NAS9-98100
by Computer Sciences Corporation

Prepared by:

J. K. Carlson, CSC Date

Reviewed by:

E. Quintin Date
ETS Technical Lead, CSC

E. Noone Date
ETS Software Manager, CSC

Approved by:

W. Fuller Date
ETS Manager, Code 581

About This Document

This document is the System User's Guide for the Scalable, Integrated, Multimission, Simulation Suite (SIMSS) PM-1 Simulator developed for the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC). The simulator is one of the deliverables of the EOSDIS Test System (ETS) PM-1 Development Task under the CSOC contract. The System User's Guide provides an overview of operational concepts and procedures for this simulator. This document is approved by GSFC Code 581, and will be maintained by Computer Sciences Corporation (CSC) under the CSOC contract.

Who Should Use This Document

This document is for anyone who wishes to use the SIMSS/PM-1 Simulator. To use this simulator effectively you should already be familiar with the basics of the Windows NT Operating System as well as be familiar with the EOS PM-1 Spacecraft.

Document Overview

The SIMSS/PM-1 simulator is built with SIMSS components. It contains several generic modules; inputIP, outputIP, LogModule, SerialInput, SerialOutput, Scenario and Txfile. It also has two modules, GSPM1 and SCPM1, that were customised for the EOS PM-1 mission. This document has also been assembled with SIMSS generic and PM-1 specific information.

The first chapter provides a complete description of the SIMSS client and server project user interface. It describes the core operations of building, configuring, saving, restoring and running a project. All users should read this chapter to become familiar with SIMSS terminology and the common project user interface that will be referenced in later chapters.

Next are chapters that describe each of the modules that have been delivered as components of SIMSS/PM-1. For each module, there is information on how to link it to other SIMSS modules, how to configure it, and how to control its run-time operations.

Chapter Name	Module Name	Description
GSPM1	GSPM1	Ground Station Module for PM-1
SCPM1	SCPM1	Spacecraft Module for PM-1
IP	InputIP, OutputIP	Input and Output Internet Protocol Modules
LOG	LogModule	Log Module
SI	SerialInput	Serial Input Module
SO	SerialOutput	Serial Output Module
SN	Scenario	Scenario Module
TxFile	TxFile	Transmit File Module

The final chapter provides a list of acronyms.

Table of Contents

SIMSS CLIENT-SERVER ARCHITECTURE	1
SIMSS-1.0 OVERVIEW	1
SIMSS-2.0 INSTALLING A NEW RELEASE	2
SIMSS-2.1 INSTALLING THE CLIENT	2
SIMSS-2.2 INSTALLING THE SERVER	2
SIMSS-3.0 CONFIGURATION FILES	2
SIMSS-3.1 CLIENT/PROPERTIES/SERVERS.TXT	2
SIMSS-3.2 SERVER/PROPERTIES/PROPERTY.TXT	3
SIMSS-4.0 RUN-TIME OPERATION	3
SIMSS-4.1 PROJECT STARTUP SEQUENCE	4
SIMSS-4.2 PROJECT DIRECTIVE REGION	5
<i>SIMSS-4.2.1 Set Directive</i>	5
<i>SIMSS-4.2.2 Setbuffer Directive</i>	5
<i>SIMSS-4.2.3 Get Directive</i>	6
<i>SIMSS-4.2.4 Getbuffer Directive</i>	6
SIMSS-4.3 PROJECT EVENT LOG REGION	7
SIMSS-5.0 DISPLAYS	7
SIMSS-5.1 SIMSS CLIENT MAIN WINDOW	7
<i>SIMSS-5.1.1 Add Project</i>	8
<i>SIMSS-5.1.2 Restore Project</i>	8
SIMSS-5.2 PROJECT WINDOW	8
<i>SIMSS-5.2.1 System Menu</i>	9
SIMSS-5.2.1.1 Connect to Server	9
SIMSS-5.2.1.2 Disconnect from Server	9
SIMSS-5.2.1.3 Save Project	10
SIMSS-5.2.1.4 Show Event Log	10
<i>SIMSS-5.2.2 Module Menu</i>	10
SIMSS-5.2.2.1 Add Module	10
SIMSS-5.2.2.2 Create Links	11
SIMSS-5.2.2.3 Design Mode	11
SIMSS-5.2.2.4 Module Pop-Up Menu	12
<i>SIMSS-5.2.3 Run Menu</i>	12
SIMSS-5.2.3.1 Locking a Project	13
SIMSS-5.2.3.2 Unlocking a Project	13
SIMSS-5.2.3.3 Running a Project	13
SIMSS-5.2.3.4 Stopping a Project	13
EDOS GROUND STATION MODULE FOR PM-1 (GSPM1)	14
GSPM1-1.0 OVERVIEW	14
GSPM1-2.0 INPUTS	14
GSPM1-3.0 OUTPUTS	14
GSPM1-4.0 CONTAINER ITEMS	14
GSPM1-4.1 COUNTERS	14
GSPM1-4.2 BUFFERS	14
GSPM1-4.3 GROUND MESSAGE HEADER (GMH) FIELDS	15
GSPM1-4.4 EDOS DATA UNIT (EDU) HEADER FIELDS	15
GSPM1-5.0 DISPLAYS	16
GSPM1-5.1 RUN-TIME	16
<i>GSPM1-5.1.1 Show Status</i>	16
<i>GSPM1-5.1.2 Show Command Packet</i>	16
<i>GSPM1-5.1.3 Show Telemetry Channel 1 Packet</i>	17
<i>GSPM1-5.1.4 Modify Telemetry Header</i>	18
<i>GSPM1-5.1.5 Set/Display GMT</i>	19
GSPM1-5.3 ABOUT	19
GSPM1-6.0 SPECIAL OPERATING INSTRUCTIONS	19

SPACECRAFT SIMULATION MODULE FOR PM-1 (SCPM1)	20
SCPM1-1.0 OVERVIEW	20
SCPM1-2.0 INPUTS	20
SCPM1-3.0 OUTPUTS	20
SCPM1-4.0 CONTAINER ITEMS	20
SCPM1-4.1 TELEMETRY CONTAINER ITEMS	20
SCPM1-4.1.1 Telemetry Status and Control Container Items	21
SCPM1-4.1.2 Telemetry Point Container Items	21
SCPM1-4.1.3 Telemetry Packet Container Items	21
SCPM1-4.1.4 Telemetry Dump Packet Container Items	22
SCPM1-4.1.5 Telemetry VCDU Container Items	22
SCPM1-4.2 COMMAND CONTAINER ITEMS	23
SCPM1-4.2.1 Mission Specific Container Items	23
SCPM1-4.2.2 Command Validation Container Fields/Flags	23
SCPM1-4.2.3 Command Container Buffers	24
SCPM1-4.2.4 Command Triggering Scenarios Container Items	25
SCPM1-4.2.5 Command Container Counters	25
SCPM1-4.3 DATABASE CONTAINER ITEMS	26
SCPM1-5.0 DISPLAYS	27
SCPM1-5.1 CONFIGURATION MENU	27
SCPM1-5.1.1 Load Database	27
SCPM1-5.1.2 Select Simulation Mode	28
SCPM1-5.2 RUN-TIME MENU	28
SCPM1-5.2.1 Main Display	28
SCPM1-5.2.1.1 Telemetry Menus	29
SCPM1-5.2.1.1.1 Modify Packet Display	29
SCPM1-5.2.1.1.2 Telemetry Packet Display	30
SCPM1-5.2.1.1.3 Telemetry Status Display	31
SCPM1-5.2.1.1.4 Control Packet Display	31
SCPM1-5.2.1.1.5 Initiate Dump Packets	32
SCPM1-5.2.1.1.6 Display/Set Container Items	32
SCPM1-5.2.1.1.7 Display Container Buffer	33
SCPM1-5.2.1.1.8 Modify CCSDS Unsegmented Time Code	34
SCPM1-5.2.1.2 Command Menu	34
SCPM1-5.2.1.2.1 Display Command Status	35
SCPM1-5.2.1.2.2 Modify Validation Criteria	35
SCPM1-5.2.1.2.2.1 None Validation Option	35
SCPM1-5.2.1.2.2.2 Validation of CLTU Start and Tail Sequences	36
SCPM1-5.2.1.2.2.3 BCH Error Code Validation Option	36
SCPM1-5.2.1.2.2.4 Transfer Frame Header Validation Option	36
SCPM1-5.2.1.2.2.5 Farm (Valid Frame Sequence) Validation Option	37
SCPM1-5.2.1.2.2.6 User Command Packet Header Validation Option	37
SCPM1-5.2.1.2.3 Display Spacecraft Packet	37
SCPM1-5.2.1.2.4 Display Instrument Packet	38
SCPM1-5.2.1.2.5 Override CLCWs	38
SCPM1-5.2.1.2.6 Display Spacecraft Load	39
SCPM1-5.2.1.3 Time	40
SCPM1-5.2.1.3.1 Modify Times Display	40
SCPM1-5.3 REMOVE	41
SCPM1-5.4 ABOUT	41
SCPM1-6.0 SPECIAL OPERATING INSTRUCTIONS	41
SCPM1-6.1 SERIAL MODE OPERATION	41
SCPM1-6.2 TRIGGERING SCENARIOS WITH COMMANDS	41
SCPM1-6.2.1 Using the Default Scenario Directory	41
SCPM1-6.2.2 Using an Alternate Scenario Directory	42
SCPM1-6.2.3 Update/Replace Command Trigger Definitions	42
INTERNET PROTOCOL (IP) MODULES	43

IP-1.0 OVERVIEW	43
IP-2.0 INPUTS	43
IP-3.0 OUTPUTS.....	43
IP-4.0 CONTAINER ITEMS	43
IP-5.0 DISPLAYS.....	43
IP-5.1 CONFIGURATION.....	44
IP-5.2 RUN-TIME	44
<i>IP-5.2.1 Resume</i>	45
<i>IP-5.2.2 Pause</i>	45
<i>IP-5.2.3 Show Raw Packet</i>	45
<i>IP-5.2.4 Show Status</i>	46
IP-5.3 ABOUT	46
IP-6.0 SPECIAL OPERATING INSTRUCTIONS	46
LOG (LOG) MODULE	47
LOG-1.0 OVERVIEW	47
LOG-2.0 INPUTS	47
LOG-3.0 OUTPUTS	47
LOG-4.0 CONTAINER ITEMS	47
LOG-5.0 DISPLAYS	47
LOG-5.1 CONFIGURATION	47
<i>LOG-5.1.1 Log File Name</i>	48
<i>LOG-5.1.2 Maximum Log Size</i>	48
<i>LOG-5.1.3 Packet Size</i>	48
<i>LOG-5.1.4 Log With Header</i>	48
<i>LOG-5.1.5 Variable Length Output</i>	48
LOG-5.2 RUN-TIME.....	49
<i>LOG-5.2.1 Resume</i>	49
<i>LOG-5.2.2 Pause</i>	49
<i>LOG-5.2.3 Show Status</i>	49
LOG-5.3 ABOUT	49
LOG-6.0 SPECIAL OPERATING INSTRUCTIONS	49
SERIAL INPUT (SI) MODULE.....	50
SI-1.0 OVERVIEW	50
SI-2.0 INPUT	50
SI-3.0 OUTPUT	50
SI-4.0 CONTAINER ITEMS	50
SI-5.0 DISPLAYS.....	50
SI-5.1 CONFIGURATION.....	50
SI-5.2 RUN-TIME	52
<i>SI-5.2.1 Display Status</i>	52
<i>SI-5.2.2 Display Dump Menu</i>	52
SI-5.2.2.1 Display Buffer Current Configuration.....	53
SI-5.2.2.2 Display Buffer True Format	53
<i>SI-5.2.3 Resume</i>	54
<i>SI-5.2.4 Pause</i>	54
SI-5.3 REMOVE	54
SI-5.4 ABOUT	54
SI-6.0 SPECIAL OPERATING INSTRUCTIONS	54
SERIAL OUTPUT (SO) MODULE	55
SO-1.0 OVERVIEW	55
SO-2.0 INPUT	55
SO-3.0 OUTPUT	55
SO-4.0 CONTAINER ITEMS	55

SO-5.0 DISPLAYS	55
SO-5.1 CONFIGURATION	55
SO-5.2 RUN-TIME.....	56
SO-5.2.1 Display Status	57
SO-5.2.2 Display Dump Menu	57
SO-5.2.2.1 Display Buffer Current Configuration	57
SO-5.2.2.2 Display Buffer True Format.....	58
SO-5.2.3 Resume.....	59
SO-5.2.4 Pause	59
SO-5.3 REMOVE	59
SO-5.4 ABOUT	59
SO-6.0 SPECIAL OPERATING INSTRUCTIONS	59
SCENARIO (SN) MODULE.....	60
SN-1.0 OVERVIEW	60
SN-2.0 INPUTS.....	60
SN-2.1 SERVER/PROPERTIES/PROPERTY.TXT	60
SN-2.2 MODULE TRIGGERED SCENARIOS.....	60
SN-2.3 SCENARIO FILE INPUT	60
SN-2.3.1 Scenario File Format.....	61
SN-2.3.2 Sample Scenario File	61
SN-3.0 OUTPUTS	61
SN-4.0 CONTAINER ITEMS	61
SN-5.0 DISPLAYS	62
SN-5.1 CONFIGURE	62
SN-5.2 RUN-TIME.....	62
SN-5.2.1 Scenario Control Display.....	62
SN-5.2.2 Scenario File Browser	63
SN-5.3 ABOUT	64
SN-6.0 SPECIAL OPERATING INSTRUCTIONS	64
SN-6.1 BUILT-IN DELAYS IN SCENARIO FILES.....	64
SN-6.2 STOPPING NESTED OR TRIGGERED SCENARIOS	65
TRANSMIT FILE (TXFILE) MODULE	66
TXFILE-1.0 OVERVIEW.....	66
TXFILE-2.0 INPUTS.....	66
TXFILE-3.0 OUTPUTS	66
TXFILE-4.0 CONTAINER ITEMS.....	66
TXFILE-5.0 DISPLAYS	67
TXFILE-5.1 CONFIGURATION DISPLAYS	67
TXFILE-5.2 RUN-TIME DISPLAYS	67
TxFile-5.2.1 Status Display.....	67
TxFile-5.2.2 Transmit Buffer Display	68
TxFile-5.2.3 Send From File.....	68
TxFile-5.2.3.1 File Types.....	70
TxFile-5.2.3.2 Example 1 Manual Mode Transmission	72
TxFile-5.2.3.3 Example 2 Auto-Complete File Transmission.....	73
TxFile-5.2.3.4 Example 3 Auto-Blocks Transmission (Raw Fixed Data Files Only)	74
TxFile-5.2.3.5 Example 4 Use of Log File Timing (Log Files Only).....	75
TXFILE-5.3 ABOUT DISPLAY	76
TXFILE-6.0 SPECIAL OPERATING INSTRUCTIONS	76
SIMSS/PM-1 ACRONYMS	77

SIMSS Client-Server Architecture

The Scalable, Integrated, Multimission Simulation Suite (SIMSS) is a distributed, component-based, plug-and-play, client-server system useful for performing real-time simulations and communications testing in support of NASA projects.

SIMSS-1.0 Overview

SIMSS runs on one or more Windows NT workstations. It is designed to be user-configurable or to use predefined configurations for routine operations.

Terminology:

- Client: The workstation on which the user interface runs. It also refers to the applications making up the user interface.
- Server: The workstation on which the actual data processing is performed. It also refers to the applications making up the data processing component.
- Module: A self-contained SIMSS component that receives, processes, or transmits data, or any combination of the three.
- Channel: An interface or port through which a module receives or transmits data. A module may have zero to many channels.
- Link: A directional connection between module channels. A link connects an output channel of one module with the input channel of another module.
- Project: A collection of modules and links intended to perform a specific function such as spacecraft simulation, data quality monitoring, or data conversion.
- Event Message: A time-tagged text message generated by the modules to inform the operator. Event messages may report warning or error conditions as well as successful activities.
- Directive: A text-based command line entry that operators submit to individual modules. The directive entry line window is below the configuration window in the main SIMSS display.
- Container: A repository internal to each module that contains all of the vital data for that module. The container is used to exchange data between the client and server. Built-in functions of the container support save and restore operations.
- Scenario: A file that contains directives. A scenario module may execute this file in order to send a timed repeatable sequence of directives to a linked module.

SIMSS-2.0 Installing A New Release

SIMSS-2.1 Installing the Client

To install the SIMSS client, run *jdk1_2_1-win.exe* located in the *\jdk* folder on the delivery CD. After JDK1.2.2 is installed, the next step is to run *setup.exe* in the *\client* folder on the CD and follow the prompts. Upon completion of the client installation, a SIMSS Client icon will be installed on the desktop. The SIMSS Client icon will point to the executable directory for the client software. Below this directory are three additional directories: images, properties, and save.

Directory	Description
images	Contains bitmapped image files.
properties	Contains client configuration files.
save	This directory is where client information is stored when projects are saved. The user may want to delete old files from this directory. (Files with the same names should also be deleted from the Server save directory)

SIMSS-2.2 Installing the Server

To install the SIMSS server, run *setup.exe* in the *\server* folder on the CD and follow the prompts. Upon completion of the server installation, a SIMSS Server icon will be installed on the desktop. The SIMSS Server icon will point to the executable directory for the server software. Below this directory are four additional directories: elog, properties, save and scenario.

Directory	Description
elog	Contains event message log files. The user may want to delete old event message log files from this directory to reclaim disk space.
properties	Contains the server property.txt configuration file.
save	This directory is where server information is stored when projects are saved. The user may want to delete old files from this directory. (Files with the same names should also be deleted from the Client save directory)
scenario	Contains delivered scenario files. The user may store additional scenario files here.

Note: The user needs administrative rights in order to install the SIMSS Server.

SIMSS-3.0 Configuration Files

SIMSS-3.1 Client/Properties/Servers.txt

Before running the SIMSS Client, please check that the correct IP address for running the SIMSS Server is in the *properties/servers.txt* file. The format for entries in this file is:

Servername, IP address
Example:

localhost,127.0.0.1

SIMSS-3.2 Server/Properties/Property.txt

There are several parameters that may be configured in the server. Most of them are for debugging purposes. These parameters are stored in the *properties/property.txt* file. This file is read in each time that the server is started. The values used from the *property.txt* file are written into the server text window. The *property.txt* file contains descriptions of the parameters and their normal settings. Use caution in making modifications to this file. Some parameters that may be of interest to users are listed below.

Property	Description
EventMsgLogSize	This is a maximum event message log size. When this many event messages have been logged, the oldest messages will be overwritten. When set to zero, there is no limit on the number of event messages that are saved to the log.
DelOldLog	This flag is for deleting the old event log file on startup. (0=no, 1=yes). This is only effective if the event log file name is the same for each execution. Use with DefaultEventLogSave.
DefaultEventLogSave	This flag specifies use of the same event log file name for each execution (0=use different names, 1=use same name).
ConcurrentScenario	This flag applies to scenario modules in the project. The scenario mode may be set to 0 for serial operation or 1 for concurrent operation. It is normally set to 1. This parameter applies only to scenario files that are not under direct operator GUI control, such as scenario files started by other scenario files. If too many scenarios run concurrently, there could be system resource issues.

SIMSS-4.0 Run-time Operation

The SIMSS architecture can support a variety of applications by connecting generic and mission-specific modules in different combinations. The general steps for starting up a SIMSS project are summarized in the next subsection. More detailed examples of these steps are provided in SIMSS-5.0, which describes the graphical user interface.

While SIMSS applications can perform vastly different functions and have customized user interfaces tailored to those functions, there are two run-time regions of the project window that are common to all SIMSS projects. The *project directive* region and the *project event log* region are described later in this chapter.

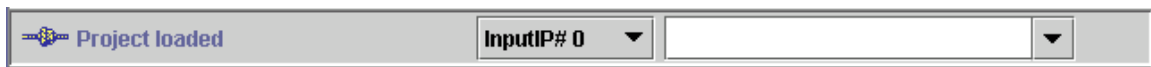
Other chapters in this system user's guide are devoted to the various generic and mission-specific modules. Please refer to these chapters for detailed information on module configuration and run-time operations.

SIMSS-4.1 Project Startup Sequence

SIMSS Startup Steps	Description
1) Start the Server	Double-click the Server icon on the PC desktop. When the Server is started, a text window is created.
2) Start the Client	Double-click the SIMSS Client icon on the desktop. When the Client is started, a Client text window is created and then the graphical user interface is started with the SIMSS Client main window.
3) Add (or Restore) a Project	Click on the SIMSS Client main window's Project menu and select "Add Project". Or, the "Restore From" selection can be used to load a previously saved project. A project window is created within the main window. If a previously saved project is restored, skip to step 7.
4) Connect Project to Server	In the project window, click the System menu and select the "Connect" option. A list of available servers will be shown. Select a server for the connection. When you connect to the server, the message in the lower, left-hand corner of the project changes from "Status" to "Project Loaded."
5) Add Modules	In the project window, click the Module menu and select "Add Module". From the Module Selection window, click on the module to be added and the OK button. Click again in the project window for placement of the module's icon. Repeat this step until all desired modules have been added.
6) Create Links Note: Refer to module input and output link descriptions in order to connect output links to the appropriate input links!	In the project window, click the Module menu and select "Create Links". Click on a module's border and drag the cursor to the border of another module and click again. If either module has multiple links, a popup window will appear for specification of the exact links. Repeat this step to create all desired links. To cancel link creation mode, click on the Module menu and select "Design".
7) Configure Modules	Click in the center of the module and select "Configure" from the popup menu. Perform module-specific configurations. Repeat for as many modules as needed.
8) Lock the Project	In the project window, click the Run menu and "Lock".
9) Save the Project (optional)	Click the project window's System menu and select "Save Project". Specify a name for the project save file.
10) Run the Project	In the project window, click the Run menu and select "Run". All of the modules in the project will be started. Click the center of any module to access its run-time options.

SIMSS-4.2 Project Directive Region

If any module in a project accepts operator directives, the directive region in the lower right side of the project window frame is activated. If the project's event log is being shown, it appears below this region. The directive region has a module indicator button and a data entry field. When the module indicator button is clicked, a list of the modules accepting directives is shown. Click to select the module to process a directive. The button is labeled with the currently selected module. In the example below, the Input IP module is selected. Click in the data entry field to the right of the module button to start entering a directive. Alternatively, click on the down arrow to the right of the field to view up to ten previously entered directives. A previous entry may be selected, optionally edited, and submitted. Use the keyboard's enter key to send the directive to the module. Note that the directive entry line is not case sensitive. Directives are available to any module that accepts directives and has container variables.



SIMSS-4.2.1 Set Directive

The **set** directive may be used to change the value of any modifiable variable in the container for the indicated module. The format of the **set** directive is

set name value

where *name* is a container variable name and *value* is either a decimal, octal, or hexadecimal number. Octal numbers are identified by a leading zero. Hex numbers are identified by a leading 0x. The names of variables are provided in the container description for each module. If the variable is successfully set, an event message of the form

“module: *name* set to *value*”

informs the operator of the change. If the variable name is not recognized or the variable cannot be modified, an event message of the type

“module: *name* invalid, read-only or not found“

will inform the operator. If unsuccessful, verify that the module indicator is correct, that the variable name spelling is correct and that the variable is not defined as read-only.

SIMSS-4.2.2 Setbuffer Directive

The **setbuffer** directive may be used to change the value of any modifiable buffer in the container for the indicated module. The format of the **setbuffer** directive is

[setbuffer | setbufferle | setbufferandlength] *buffername* <offset> [byte | word | dword] <value> <value> <value> ...

where *buffername* is a container buffer name, *offset* is the decimal byte offset to the first item to be set, the keywords “byte”, “word”, and “dword” indicate the number of bits to set when applying values, and *value* is either a decimal, octal, or hexadecimal number. If

"setbufferle" is used, the values are put in little-endian byte order before being set in the buffer. If "setbufferandlength" is used, then the size of the buffer is set to the total size of the data values set. The **setbuffer** directive entry line is limited to 100 characters. The names of alterable buffers are provided in the container description for each module. An example of setbuffer usage is:

```
setbuffer TlmPacket0140 20 byte 10 012 0xA
```

In this example, three bytes of the buffer TlmPacket0140 beginning at offset 20 are set to 10. If the buffer is successfully set, an event message of the form

“module: values set in buffer *buffername*”

informs the operator of the change. If the buffer name is not recognized or the buffer cannot be modified, an event message of the form

“module: *buffername* not found”

will inform the operator. If unsuccessful, verify that the module indicator is correct, that the buffer name spelling is correct, and that the buffer is not defined as read-only.

SIMSS-4.2.3 Get Directive

The **get** directive may be used to display the value of any variable in the container for the indicated module. The format of the **get** directive is

```
get name
```

If the name matches a variable in the module's container, an event message of the form

“module: *name* = value“

is written to the event message log. If the name doesn't match a container variable, an error event message of the form

“module: *name* not found”

will be produced. If unsuccessful, check the setting of the module indicator and the spelling of the container variable name.

SIMSS-4.2.4 Getbuffer Directive

The **getbuffer** directive may be used to change the value of any modifiable buffer in the container for the indicated module. The format of the **getbuffer** directive is

```
getbuffer[le] buffername <offset> [byte | word | dword] <count>
```

where *buffername* is a container buffer name, *offset* is the decimal byte offset to the first item to be set, the keywords “byte”, “word”, and “dword” indicate the size of data to retrieve at one time, and *count* is the number of items of data to retrieve. If the suffix "le" is added to the typein, the data is retrieved in little-endian (Intel) byte order before being

displayed. The **getbuffer** directive entry line is limited to 100 characters. The names of alterable buffers are provided in the container description for each module. An example of **getbuffer** usage is:

```
getbuffer TlmPacket0140 20 byte 10
```

In this example, ten bytes of the buffer TlmPacket0140 beginning at offset 20 are retrieved. If there are no errors, an event message of the form

```
“module: buffername = 14 15 16 17 18 19 1a 1b 1c 1d”
```

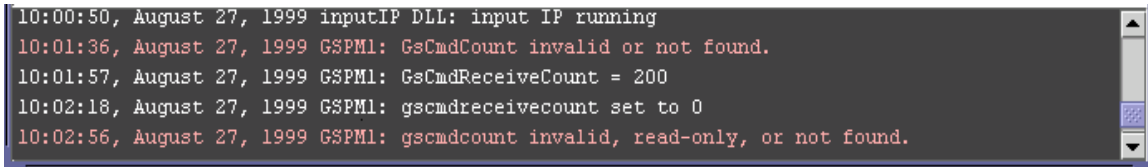
informs the operator of the data with values in hexadecimal. If the buffer name is not recognized, an event message of the form

```
“module: buffername not found”
```

will inform the operator. If unsuccessful, verify that the module indicator is correct, and that the buffer name spelling is correct.

SIMSS-4.3 Project Event Log Region

Many SIMSS modules send informative, warning or error event messages to the project's event log during configuration and run-time operations. To open the event log region at the bottom of the project window, select the “Show Event Log” option from the System menu. The example shown includes event messages from **get** and **set** directives.

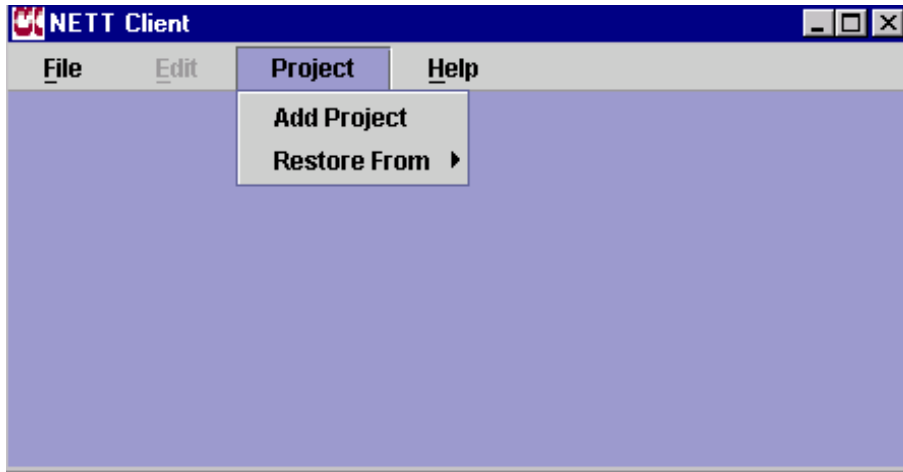


```
10:00:50, August 27, 1999 inputIP DLL: input IP running
10:01:36, August 27, 1999 GSPM1: GsCmdCount invalid or not found.
10:01:57, August 27, 1999 GSPM1: GsCmdReceiveCount = 200
10:02:18, August 27, 1999 GSPM1: gscmdreceivecount set to 0
10:02:56, August 27, 1999 GSPM1: gscmdcount invalid, read-only, or not found.
```

SIMSS-5.0 Displays

SIMSS-5.1 SIMSS Client Main Window

When the SIMSS Client is started, the main window appears. The File menu contains an “Exit” option and the Project menu contains options to add a new project and restore a project.



SIMSS-5.1.1 Add Project

To create a new project, select the "Add Project" item from the Project menu. This will add a project window within the SIMSS Client window. In future releases, multiple project windows may be created within the main window.

SIMSS-5.1.2 Restore Project

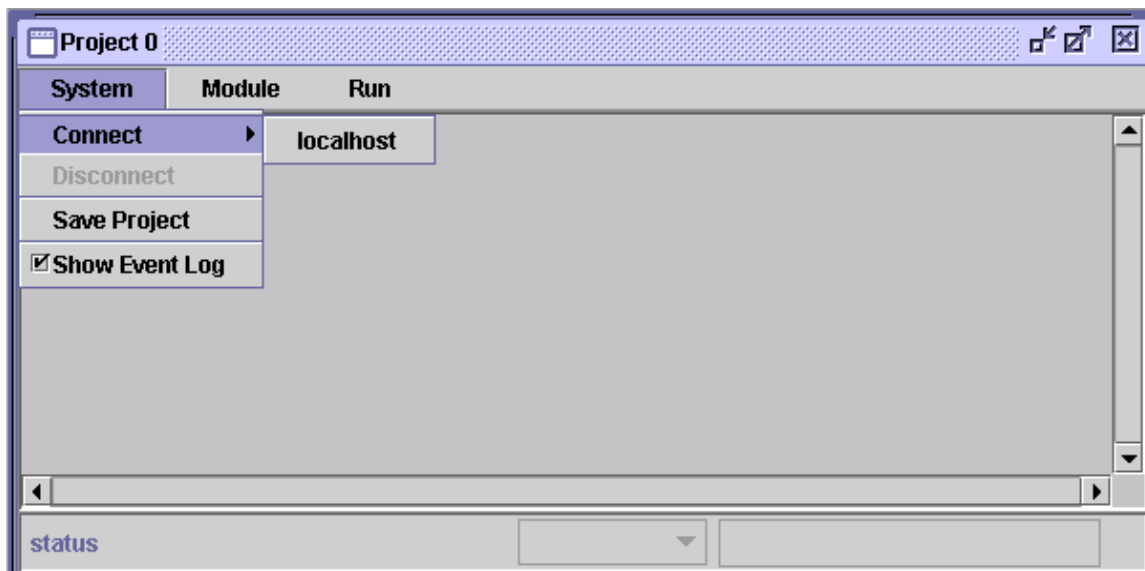
To restore an existing project, select the "Restore From" item from the Project menu. The following file selection screen will appear.



The system will search the save directory by default but another directory may be selected by clicking the Save Folder button. Select a file and click the **Open** button. Click on the **Cancel** button to dismiss the display without restoring a project.

SIMSS-5.2 Project Window

Each SIMSS application is built within a separate project.



To create a project, select the “Add Project” item from the SIMSS Client Project menu. This will add a project window that contains a System menu, a Module menu and a Run menu. At the bottom of the project window is a status field. At the bottom right is the directive region of the screen.

SIMSS-5.2.1 System Menu

The System menu on the Project window contains the following choices.

System Menu Item	Description
Connect	Connects the project to a server
Disconnect	Disconnects the project from a server
Save Project	Saves the project design to file
Show Event Log	When this option is enabled, the event log portion of the Project window is displayed.

SIMSS-5.2.1.1 Connect to Server

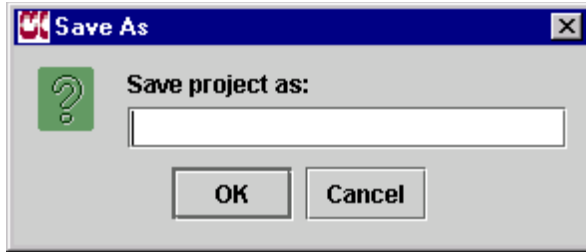
The client must be connected to a server in order to function. To make a connection to a server, select the “Connect” option from the System menu. A menu of available servers will be displayed. Click to select a server for the connection. In the above picture, only one server was available. After the client has been connected to a server, the “Disconnect” option will be enabled on the System menu and the “Connect” option will be disabled.

SIMSS-5.2.1.2 Disconnect from Server

To disconnect the client from the server, select the “Disconnect” option from the System menu. After the client has disconnected from the server, the “Disconnect” option will be disabled on the System menu and the “Connect” option will be enabled.

SIMSS-5.2.1.3 Save Project

This option allows the user to store the project's design to a file. Different design configurations of SIMSS modules may be desired for different testing environments. To save the project, select the "Save Project" option. The following screen will appear.



Enter the file name for storage of the current project and click the **OK** button to have project information written into it. The file name will have ".ser" appended to the end. Clicking **Cancel** will close this window without performing a save.

SIMSS-5.2.1.4 Show Event Log

Each project has an event log that displays time-tagged event messages received from all of its modules. The event log may be optionally displayed as a scrolling region at the bottom of the project window. Modules may send informative, warning or error messages to the event log during configuration and run-time operations.

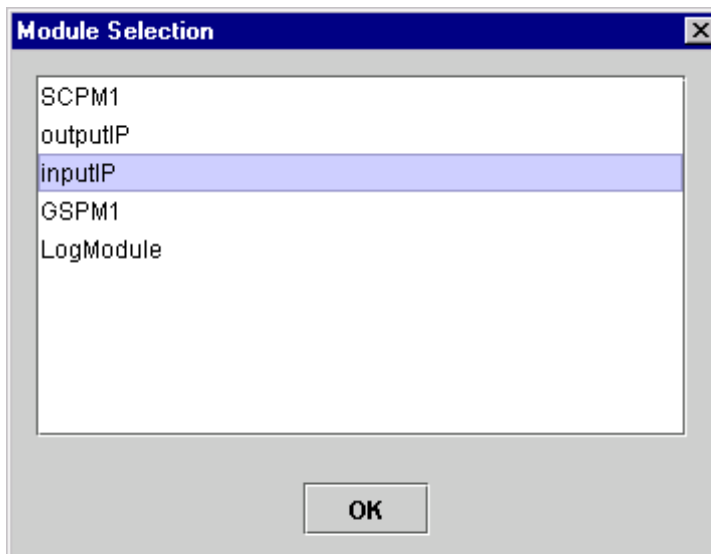
SIMSS-5.2.2 Module Menu

The Module menu on the Project window contains the following choices.

Module Menu Item	Description
Add Module	Add a module to the project's design diagram
Create Links	Create a link between modules
Design	Allows editing of the project design diagram

SIMSS-5.2.2.1 Add Module

To add a module to the project, select the "Add Module" option from the Module menu.



A list of the modules available from the server will be displayed. Click to select a module and then click the **OK** button.

Position the cursor within the project window where the top left corner of the module's symbol should be drawn and click. A rectangle representing the module will be drawn at that location. The rectangle will have a wide cyan border while in Design mode.

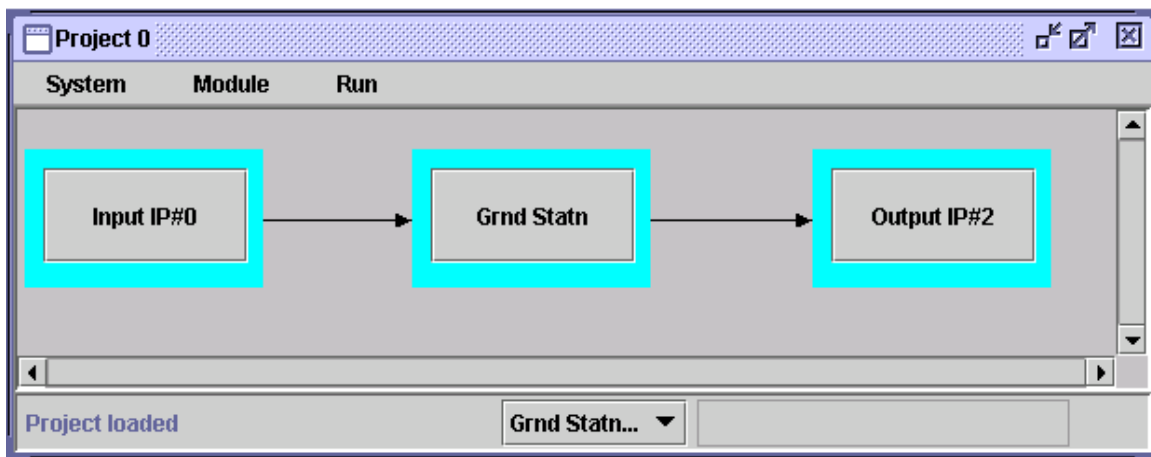
If a module is added that accepts operator directives, the directive region of the project window becomes accessible.

SIMSS-5.2.2.2 Create Links

Links are used to connect the input and output channels between modules for a given project. In the example shown below, the output channel of an Input IP module is linked to an input channel of a Ground Station module. An output channel from the Ground Station module is linked to an input channel of the Output IP module.

To create a link,

- select the “Create Links” option from the Module menu,
- position the crosshair cursor on the highlighted edge of the source module and click,
- move the cursor to the destination module’s edge and click again.



When multiple links are defined for a module, the user will be prompted to choose a channel number for the source and destination links as appropriate. Refer to module-specific information for the number of input and output channels a module can have and how they should be configured.

The cursor remains in Create Links mode to allow for the creation of additional links. The cursor appears as a crosshair symbol until a different module menu option is selected.

If multiple links are created between two modules, additional clicks may be done to anchor the link lines apart for visibility. The operator may click on a link line to review the channel numbers of the modules it connects. A popup window provides the source and destination channel numbers.

SIMSS-5.2.2.3 Design Mode

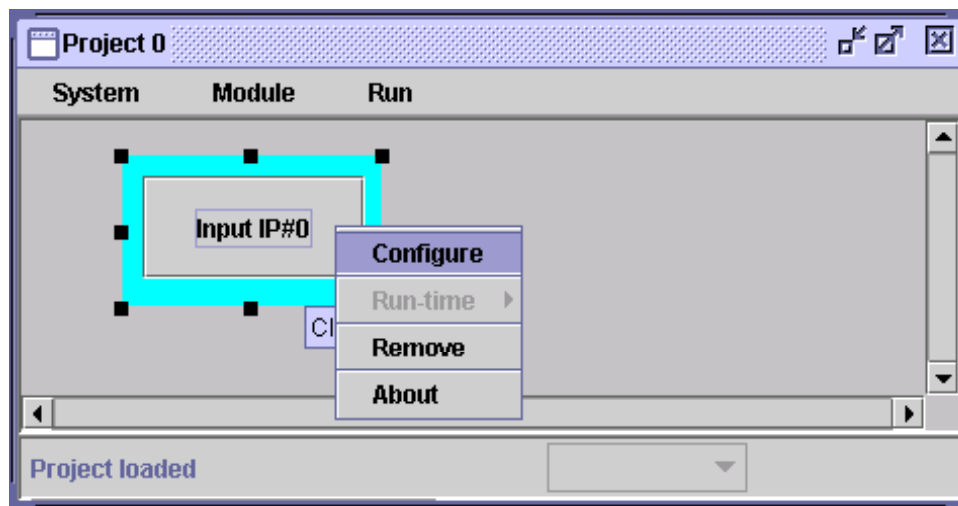
After the “Create Links” option has been used, the cursor remains as a crosshair symbol and the system remains in link creation mode. To cancel this mode, click the “Design”

option from the Module menu. The cursor is changed back into a pointer symbol and may be used to select items of the design diagram for modification.

SIMSS-5.2.2.4 Module Pop-Up Menu

Clicking in the center of a module activates a pop-up menu with the following choices.

Module Pop-Up Menu	Description
Configure	Provides access to module-specific configuration options.
Run-time	Provides access to module-specific run-time options. The “Run-time” option is only available when the project is running.
Remove	Removes the module from the project.
About	Provides information about the module.



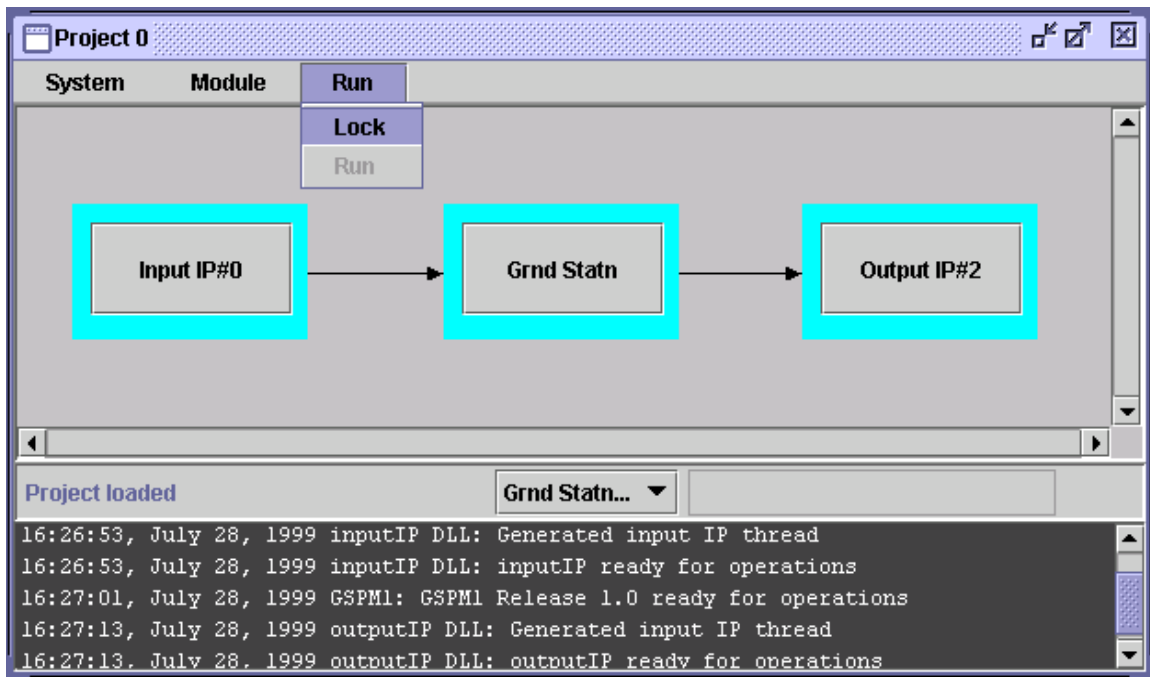
The actions initiated by the “Configure” and “Run-time” options are different for every module and are described in the other chapters of this system user’s guide that are dedicated to specific modules.

SIMSS-5.2.3 Run Menu

The Run menu on the Project window contains the following choices.

Run Menu Item	Description
Lock/Unlock	Locks/Unlocks the project’s design diagram
Run/Stop	Starts/Stops the project’s execution

SIMSS-5.2.3.1 Locking a Project



Prior to running a project, the user must lock its design by clicking the “Lock” option from the Run menu. After the design is locked, the “Lock” option is replaced by the “Unlock” option and the “Run” option becomes available on the Run menu.

SIMSS-5.2.3.2 Unlocking a Project

Click the “Unlock” option from the Run menu to allow modification to the project’s design diagram. The “Unlock” option is then replaced on the Run menu with a “Lock” option.

SIMSS-5.2.3.3 Running a Project

Click the “Run” option from the Run menu to start running all of the modules of the project. The borders of the modules will change to green to indicate run mode. The “Run” option is then replaced with a “Stop” option.

Click on specific modules to get their pop-up menus. See SIMSS-5.2.2.4 Module Pop-Up Menu for an example. Click on the Run-time option for module-specific displays or actions. Please refer to module chapters in this system user’s guide for additional information on module configuration and run-time displays.

SIMSS-5.2.3.4 Stopping a Project

Click the “Stop” option from the Run menu to stop execution of the modules of the project. The borders of the modules will change to red to indicate the stopped condition. The “Stop” option is then replaced with a “Run” option on the Run menu.

EDOS Ground Station Module for PM-1 (GSPM1)

GSPM1-1.0 Overview

The Ground Station (GS) module is responsible for receiving telemetry, adding an EDOS Service header (ESH) to telemetry packets and transmitting the data as EDOS Data Units (EDUs). The GS module provides a user interface to set EDOS Service header fields. The GS module also receives Command Data Blocks (CDB), validates and strips off the Ground Message Header (GMH), and transmits Command Link Transmission Units (CLTUs).

GSPM1-2.0 Inputs

Ch.	Data expected	Validation performed	Processing performed
1	EDOS Command Data Blocks	Checks GMH fields	Ground Message Header removed, resulting data transmitted through output channel 1
2	Telemetry packets	None	EDOS Service Header added, resulting data transmitted through output channel 2
3	Command Link Control Words (CLCWs)	None	EDOS Service Header added, resulting data transmitted through output channel 3

GSPM1-3.0 Outputs

Ch.	Description
1	Command stream with acquisition sequence and CLTUs
2	EDOS Data Units (EDUs) containing telemetry packets
3	EDOS Data Units (EDUs) containing CLCWs

GSPM1-4.0 Container Items

The GS module accepts operator directives and is capable of receiving directives from a Scenario module. Use the Set and Get directives to access items with a fixed type. Use the SetBuffer and GetBuffer directives on buffer types. Although names in the following tables contain upper and lower case, directive lines are not case-sensitive.

GSPM1-4.1 Counters

Name	Type	Description
GSCmdReceiveCount	Fixed	Number of command blocks received
GSTlmCh1TransmitCount	Fixed	Number of channel 1 blocks sent
GSTlmCh2TransmitCount	Fixed	Number of channel 2 blocks sent

GSPM1-4.2 Buffers

Name	Type	Description
GSCmdBuffer	Buffer	Most recent command block received

GSTlmCh1Buffer	Buffer	Most recent output channel 1 block sent
GSTlmCh2Buffer	Buffer	Most recent output channel 2 block sent

GSPM1-4.3 Ground Message Header (GMH) fields

Name	Type	Description
GSCmdEnableHeaderValidation	Fixed	GMH validation flag (1 = enabled, 0 = disabled)
GSCmdExpectedDestination	Fixed	GMH expected destination (1)
GSCmdExpectedMsgType	Fixed	GMH expected message type (3)
GSCmdExpectedSCID	Fixed	GMH expected SCID (0x9A)
GSCmdExpectedSource	Fixed	GMH expected source (4)
GSCmdSequenceCount	Fixed	GMH expected sequence count (0)

GSPM1-4.4 EDOS Data Unit (EDU) Header fields

There are two sets of EDU container items, one set for each telemetry channel. Each EDU has an EDOS Service Header (ESH). To access fields from telemetry channel 1, insert "GsTlmch1" for "<ch>" in the names provided in the following table. To access fields from telemetry channel 2, insert "GsClcw" for "<ch>". For example, the container name for the ESH version field of the most recent channel 1 block is "EduHeaderGsTlmCh1Version". The container name for the same field in the most recent channel 2 block is "EduHeaderGsClcwVersion".

Name	Type	Description
EduHeader<ch>Version	Fixed	ESH version field
EduHeader<ch>SDUtype	Fixed	ESH SDU type field
EduHeader<ch>PortId	Fixed	ESH Port Id
EduHeader<ch>SourceDiscontinuityFlag	Fixed	ESH Source VCDU Discontinuity Flag
EduHeader<ch>PlaybackDataFlag	Fixed	ESH Contains Playback Data Flag
EduHeader<ch>RecoveryProcessingFlag	Fixed	ESH Recovery Processing Indicator
EduHeader<ch>TestDataFlag	Fixed	ESH Test Data Indicator
EduHeader<ch>CRCfailureFlag	Fixed	ESH CRC Failure Indicator
EduHeader<ch>PathDiscontinuityFlag	Fixed	ESH Path SDU Discontinuity Flag
EduHeader<ch>PktLengthErrorFlag	Fixed	ESH Packet Length Indicator
EduHeader<ch>PacketFillFlag	Fixed	ESH Packet Fill Indicator
EduHeader<ch>FirstSpare	Fixed	ESH First Spare Field
EduHeader<ch>SCID	Fixed	ESH SCID
EduHeader<ch>VCID	Fixed	ESH VCID
EduHeader<ch>FillLocation	Fixed	ESH Fill Data Location
EduHeader<ch>SecondSpare	Fixed	ESH Second Unused Field
EduHeader<ch>RSstatus	Fixed	ESH RS Validation Status
EduHeader<ch>HeaderErrorCount	Fixed	ESH VCDU Header Error Count
EduHeader<ch>TotalErrorCount	Fixed	ESH Total Error Count

GSPM1-5.0 Displays

To access the displays for this module, first click on the center of the module in the project window. The module pop-up menu will appear.

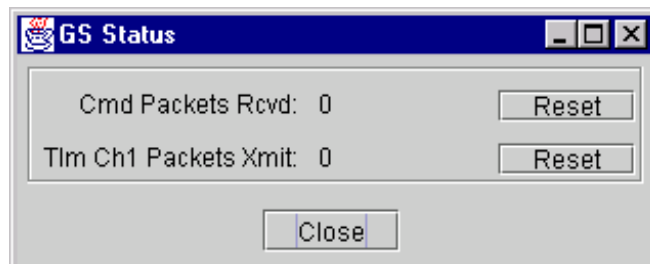
Module Pop-Up Menu Item	Description
Run-time	Access the Run-time menu for the module
Remove	Remove module from the project
About	Display generic module information

GSPM1-5.1 Run-time

There are five displays available from the Run-time menu.

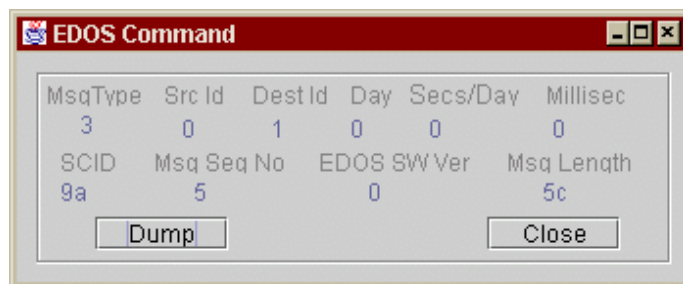
Run-time Menu Item	Description
Show Status	Show counts of commands and telemetry packets
Show Cmd Packet	Display the command buffer
Show Tlm CH1 Packet	Display the housekeeping telemetry buffer
Modify Tlm Header	Modify header fields in housekeeping telemetry
Set/Display GMT	Display time fields for possible modification

GSPM1-5.1.1 Show Status

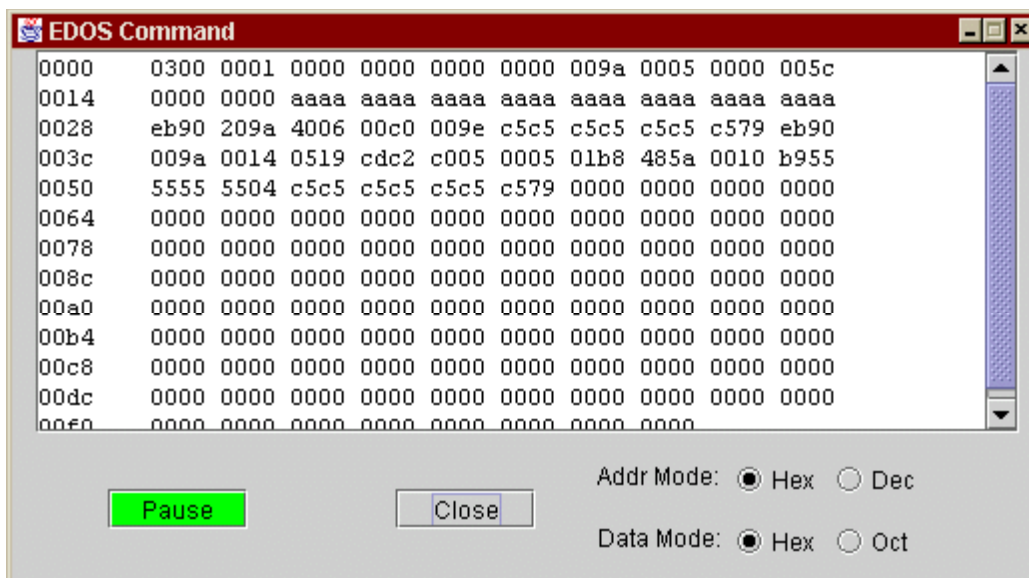


The status display shows the number of command blocks received and the number of housekeeping telemetry blocks transmitted. The **Reset** button may be used to zero out the counter in the same row.

GSPM1-5.1.2 Show Command Packet



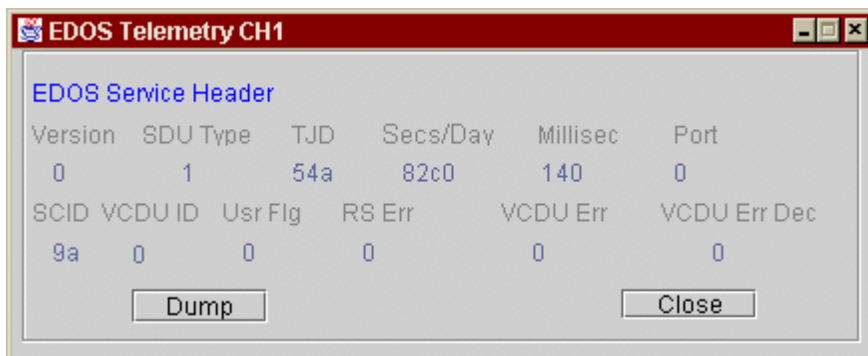
The command packet display shows the header and, optionally (by pressing the **Dump** button), the contents of the most recent command block received, including the Ground Message Header.



The address field of the dump display may be toggled between hexadecimal and decimal display formats. The data portion may be toggled between hexadecimal and octal formats.

GSPM1-5.1.3 Show Telemetry Channel 1 Packet

The telemetry channel 1 packet display shows the header and, optionally (by pressing the **Dump** button), the contents of the most recent telemetry block as transmitted through telemetry channel 1 (module output channel 2).



The screenshot shows a window titled "EDOS Telemetry CH1". It contains a grid of 16 columns and 12 rows of data. The first column contains addresses from 0000 to 0220 in increments of 20. The subsequent 15 columns contain numerical values. Below the grid, there are two buttons: "Pause" (highlighted in green) and "Close". To the right of the buttons, there are two sets of radio buttons: "Addr Mode" with "Oct" and "Dec" (where "Dec" is selected), and "Data Mode" with "Hex" and "Oct" (where "Oct" is selected).

GSPM1-5.1.4 Modify Telemetry Header

The screenshot shows a window titled "GSPM1 #5 Modify Tlm ESH". It contains a list of fields, each with a checkbox and a numeric input field. The fields are arranged in two columns. The first column includes: Version, SDU Type, EDOS Port ID, Src Discontinuity, Playback Data, Recovery Proc., Test Data, CRC Failure, and Path Discontinuity. The second column includes: Pkt Length Err, Packet Fill, First Spare, Spacecraft ID, VCID, Fill Location, Second Spare, Reed-Solomon Status, Header Error Count, and Total Error Count. At the bottom, there are two buttons: "Apply" and "Close".

The Modify Tlm ESH display allows the operator to change values in the EDOS service header of housekeeping telemetry. Some these changes are in effect for a single packet. Fields marked with an asterisk (*) in the following table are non-sticky. That is, they reset to zero after the transmission of one packet. To change the PB5 Time field, use the Set/Display GMT display described in the next section. To change ESH values in CLCW telemetry, use Set directives on the CLCW ESH field names listed in section 4.4.

Modify Tlm ESH Fields	Description
Version	ESH Version Number
SDU Type	SDU Type
EDOS Port ID	EDOS Port ID

Src Discontinuity*	Source VCDU Sequence Counter Discontinuity
Playback Data	VCDU Contains Playback Data
Recovery Proc	Recovery Processing Indicator
Test Data	Test Data Indicator
CRC Failure*	CRC Failure Indicator
Path Discontinuity*	Path SDU Source Seq. Counter Discontinuity
Pkt Length Err*	Packet Length Error
Packet Fill*	Packet Fill Indicator
First Spare	Spare field
Spacecraft ID	Spacecraft identification code
VCID	VCDU Id
Fill Location	Location 1 st byte Fill Data For Path SDU
Second Spare	Spare field
Reed-Solomon Status*	RS Error Control Flag
Header Error Count	Source VCDU Header Error Decode Results
Total Error Count	Source VCDU Error Decode Results

GSPM1-5.1.5 Set/Display GMT

This display shows the current GMT time that is converted and stored in the EDOS Server Header. The user may **Set** the GMT time fields manually, **Keep** the time currently being used, or **Reset** time to the current system time. The data entry fields are year, day of year, hour of day, minute of hour, and second of minute.

Click the **Apply** button for the actions to take effect. Click the **Close** button to dismiss the window with no further action taken.

GSPM1-5.3 About

To display generic information about the GS module, choose the “About” option from the module pop-up menu.

GSPM1-6.0 Special Operating Instructions

There are no special operating instructions for the current release.

Spacecraft Simulation Module for PM-1 (SCPM1)

SCPM1-1.0 Overview

The functions of the Spacecraft module for PM-1 (SCPM1) include generation and transmission of formatted telemetry packets, receipt of command link transmission units (CLTUs), and maintenance of GMT and spacecraft time. GMT time is maintained separately by this module for time tagging of event messages. Spacecraft time is maintained as an offset from the PM-1 epoch and is inserted into telemetry packets prior to sending them to the Ground Station module. This module is also capable of displaying telemetry packets and received commands under operator direction.

SCPM1-2.0 Inputs

Ch.	Data expected	Validation performed	Processing performed
1	Scenario directives	Same as for operator directives	Directives from a scenario module are processed as if they had come from the user interface directive line.
2	Command stream	CCSDS and PM-1 specific	Commands parsed and validated per CCSDS standard and PM-1 extensions. Event messages generated on valid or invalid commands.

SCPM1-3.0 Outputs

The SCPM1 module has 2 types of output channels. When the module is using IP mode, only channels 1 and 2 are used. When the module is using Serial mode only channel 3 is used.

Ch.	Description
1	Housekeeping telemetry packets
2	Command Link Control Words (CLCWs)
3	Serial telemetry transmission

SCPM1-4.0 Container Items

This module accepts operator directives and is capable of receiving directives from a Scenario module. Use the Set and Get directives to access items with a fixed or string type. Use the SetBuffer and GetBuffer directives on buffer types. Although names in the following tables contain upper and lower case, directive lines are not case sensitive.

SCPM1-4.1 Telemetry Container Items

The container items for telemetry processing fall into four major groups: control and status of telemetry streams, telemetry points, packet buffers, and VCDU buffers.

SCPM1-4.1.1 Telemetry Status and Control Container Items

Name	Type	Description
clwvkt	Fixed	CLCW packet buffer
PM1TlmChannel1Enabled	Fixed	Channel 1 enabled flag (0=disabled, 1=enabled)
PM1TlmChannel1FrameCount	Fixed	Channel 1 frames transmitted count
TransmitCLCW	Fixed	CLCW enabled flag (0=disabled, 1=enabled)
PM1CLCWFrameCount	Fixed	CLCW channel transmitted count
TlmCUCpfield	Fixed	P-field for CUC time in packet header
TlmCUCpfieldextension	Fixed	P-field extension for CUC time in packet header
SCPM1EnabledCH1	Fixed	Flag to start/stop channel 1
SCPM1EnabledCH2	Fixed	Flag to start/stop channel 2
SCPM1OutputFormat	Fixed	Flag to change output format
SCPM1PktDropCnt	Fixed	Used to check if any VCDU packets were dropped
SCPM1Interval3	Fixed	Interval for automatic sending of VCDUs on physical channel 3

SCPM1-4.1.2 Telemetry Point Container Items

All of the telemetry points that are simulated by the SCPM1 module have their values stored in the container as 32-bit values and are identified by their mnemonic names. For example, for the telemetry point COM_BR_TXB (Xmtr B ON/OFF Status), the container name is COM_BR_TXB. The value of this telemetry point may be viewed in an event message by entering “get COM_BR_TXB” on the directive line and specifying SCPM1 to receive it. The value of any telemetry point can be changed at the directive line using the set command. The set directive may also be used within scenario files.

SCPM1-4.1.3 Telemetry Packet Container Items

For each APID in telemetry there are container items to hold that APID's packet. Where “<APID>” appears in the following table, substitute the APID number in 4 decimal digits. For example, the container buffer for APID 397 is named “TlmPacket0397”.

Name	Type	Description
TlmPacket<APID>	Buffer	Buffer for specified APID's telemetry packet.
TlmPacket<APID>SequenceCount	Fixed	Sequence count for APID's packet header
TlmPacket<APID>SequenceFlag	Fixed	Sequence flag for APID's packet header
TlmPacket<APID>APID	Fixed	APID for packet header
TlmPacket<APID>SecondaryHeaderFlag	Fixed	Secondary header flag for APID's packet header
TlmPacket<APID>DataLength	Fixed	Data length for APID's packet

		header
TlmPacket<APID>Version	Fixed	Version for APID's packet header
TlmPacket<APID>Type	Fixed	Type for APID's packet header

SCPM1-4.1.4 Telemetry Dump Packet Container Items

The dump packets are not generated from the database. In order to simulate a dump, the following dump parameters must be set. As soon as the dump word count is given, the dump packets will be formatted and transmitted until all of the specified words have been dumped. The dump word buffer may be set by a series of setBuffer directives. The dump header information may be set using directives or the "Initiate Dump Packets..." selection from the Telemetry Menu.

Command load processing optionally copies the first segment of data words in a command load to the telemetry dump data buffer. As long as successive command loads contain consecutive memory locations, data words will be copied. Event messages produced during command load processing will provide information for starting a telemetry dump of the loaded memory locations.

Name	Type	Description
CmdLoadCopyToDump	Fixed	Automatic copying of command load buffer to telemetry dump buffer enabled flag (0=disabled, 1=enabled)
CmdLoadValidChecksum	Fixed	Flag for validating command load buffer's checksum (0=disabled, 1=enabled)
DumpMemoryAddress	Fixed	Memory address expected for next consecutive command load
DumpMemoryPosition	Fixed	Current byte position for automatic copy into the telemetry dump data buffer
Pm1cmdSpaceLoadBuffer	Buffer	Spacecraft memory load buffer (1024 bytes)
SCPM1DumpAPID	Fixed	Dump packet APID
SCPM1DumpInterval	Fixed	Interval in milliseconds between dump packets: 10000 = 10 seconds, defaults to 1000 (1 second)
SCPM1DumpPacketSize	Fixed	Size of dump packet default is 256
SCPM1DumpSecondaryHeader	Fixed	0 = no secondary header 1 = secondary header with CUC
SCPM1DumpStartAddress	Fixed	Starting memory dump address
SCPM1DumpWordCount	Fixed	Number of 16 bit words to dump
SCPM1SCMemory	Buffer	6000 byte telemetry dump data buffer

SCPM1-4.1.5 Telemetry VCDU Container Items

For each virtual channel in serial mode telemetry, there are container items that hold each VCDU's Primary Header field values. Where "<VCDU>" appears in the following table, substitute the virtual channel number, starting from 0 and using decimal digits. For example, the container item for VCDU 0's Primary Header Version field is named

“VCDUVERSION0”. The container item for VCDU 44’s Primary Header Version field is named “VCDUVERSION44”. All PM-1 telemetry is transmitted on virtual channel 2.

Name	Type	Description
VCDUVERSION<VCDU>	Fixed	Version Number
VCDUSCID<VCDU>	Fixed	Spacecraft ID
VCDUVCID<VCDU>	Fixed	Virtual Channel ID
VCDUCOUNTER<VCDU>	Fixed	VCDU Counter
VCDUREPLAY<VCDU>	Fixed	Replay Flag
VCDURESERVED<VCDU>	Fixed	Reserved Flags
VCDUERRORCTL<VCDU>	Fixed	Error Control (optional)

SCPM1-4.2 Command Container Items

The container items for the command processing fall into several groups: mission specific items, validation fields, processing buffers and command triggering scenarios and counts. The initial values for counts, flags and buffers are zero. Non-trivial initial values for other items are shown in parentheses following the description.

SCPM1-4.2.1 Mission Specific Container Items

The initial values for these items were taken from the EOS PM-1 Spacecraft to Ground ICD (GSFC 422-11-19-03) Dated December 1999. Values may be changed using set or setBuffer directives from the directive line or from a scenario file.

Name	Type	Description
Pm1cmdCltuCodeblockSize	Fixed	Codeblock size in bytes (8)
Pm1cmdCltuExpectedStartSequence	Buffer	Expected CLTU start sequence buffer (2 bytes) (EB90 ₁₆)
Pm1cmdCltuExpectedTailSequence	Buffer	Expected CLTU tail sequence buffer (8 bytes) (C5C5 C5C5 C5C5 C579 ₁₆)
Pm1cmdCriticalTieAVCID	Fixed	Virtual Channel ID (VCID) for TIE-A critical commands (16)
Pm1cmdCriticalTieBVCID	Fixed	Virtual Channel ID for TIE-B critical commands (17)
Pm1cmdSCID	Fixed	PM-1 Spacecraft Identifier (9A ₁₆)
Pm1cmdSlidingWindowSize	Fixed	FARM-1 Sliding Window Size (180)

SCPM1-4.2.2 Command Validation Container Fields/Flags

Name	Type	Description
Pm1cmdEnabled	Fixed	Command processing enabled flag. (0=disabled, 1=enabled)
Pm1cmdCLTUValidation	Fixed	Command CLTU validation enabled flag. (0=disabled, 1=enabled)
Pm1cmdCodeblockValidation	Fixed	Command codeblock parity validation enabled

		flag. (0=disabled, 1=enabled)
Pm1cmdFrameValidation	Fixed	Command transfer frame header validation enabled flag. (0=disabled, 1=enabled)
Pm1cmdFARMValidation	Fixed	Command Frame Acceptance and Reporting Mechanism (FARM) validation enabled flag. (0=disabled, 1=enabled)
Pm1cmdPacketValidation	Fixed	Command packet validation enabled flag. (0=disabled, 1=enabled)
Pm1cmdDebugEnabled	Fixed	Command subsystem debug messages flag. (0=disabled, 1=enabled) When enabled, additional event messages are generated throughout command ingest processing.
Pm1cmdSpaceClwCWT	Fixed	Spacecraft CLCW Control Word Type
Pm1cmdSpaceClwVersion	Fixed	Spacecraft CLCW Version
Pm1cmdSpaceClwStatus	Fixed	Spacecraft CLCW Status
Pm1cmdSpaceClwCOP	Fixed	Spacecraft CLCW COP In Effect
Pm1cmdSpaceClwVCID	Fixed	Spacecraft CLCW VCID (0)
Pm1cmdSpaceClwSpare1	Fixed	Spacecraft CLCW Spare field 1
Pm1cmdSpaceClwNoRFAvail	Fixed	Spacecraft CLCW No RF Avail Flag
Pm1cmdSpaceClwNoBitLock	Fixed	Spacecraft CLCW No Bit Lock Flag
Pm1cmdSpaceClwLockout	Fixed	Spacecraft CLCW Lockout Flag
Pm1cmdSpaceClwWait	Fixed	Spacecraft CLCW Wait Flag
Pm1cmdSpaceClwRetransmit	Fixed	Spacecraft CLCW Retransmit Flag
Pm1cmdSpaceClwFarmCount	Fixed	Spacecraft CLCW Farm-B Counter
Pm1cmdSpaceClwSpare2	Fixed	Spacecraft CLCW Spare field 2
Pm1cmdSpaceClwReport	Fixed	Spacecraft CLCW Report Value
Pm1cmdInstrClwCWT	Fixed	Instrument CLCW Control Word Type
Pm1cmdInstrClwVersion	Fixed	Instrument CLCW Version
Pm1cmdInstrClwStatus	Fixed	Instrument CLCW Status
Pm1cmdInstrClwCOP	Fixed	Instrument CLCW COP In Effect
Pm1cmdInstrClwVCID	Fixed	Instrument CLCW VCID (1)
Pm1cmdInstrClwSpare1	Fixed	Instrument CLCW Spare field 1
Pm1cmdInstrClwNoRFAvail	Fixed	Instrument CLCW No RF Avail Flag
Pm1cmdInstrClwNoBitLock	Fixed	Instrument CLCW No Bit Lock Flag
Pm1cmdInstrClwLockout	Fixed	Instrument CLCW Lockout Flag
Pm1cmdInstrClwWait	Fixed	Instrument CLCW Wait Flag
Pm1cmdInstrClwRetransmit	Fixed	Instrument CLCW Retransmit Flag
Pm1cmdInstrClwFarmCount	Fixed	Instrument CLCW Farm-B Counter
Pm1cmdInstrClwSpare2	Fixed	Instrument CLCW Spare field 2
Pm1cmdInstrClwReport	Fixed	Instrument CLCW Report Value

SCPM1-4.2.3 Command Container Buffers

Name	Type	Description
Pm1cmdPolyRemainderTbl	Buffer	Polynomial remainder table for parity calculation.

		(256 bytes)
Pm1cmdSpacecraftCLCW	Buffer	Spacecraft virtual channel CLCW buffer (4 bytes)
Pm1cmdInstrumentCLCW	Buffer	Instrument virtual channel CLCW buffer (4 bytes)
Pm1cmdScPkt	Buffer	Spacecraft command packet buffer (128 bytes)
Pm1cmdInstrPkt	Buffer	Instrument command packet buffer (128 bytes)
Pm1cmdFrameBuffer	Buffer	Command transfer frame buffer (256 bytes)
Pm1cmdCLTU	Buffer	Command link transmission unit buffer (6000 bytes)
Pm1cmdCodeblock	Buffer	Compressed codeblock buffer (holds codeblock bytes without parity bytes) (6000 bytes)

SCPM1-4.2.4 Command Triggering Scenarios Container Items

Name	Type	Description
ScenarioPath	String	Full pathname of directory where the command triggering scenario definition file can be found. Path should end with slash character.
ReadScenFile	Fixed	Whenever a set directive accesses this flag, the command triggering scenario definition file is re-read, replacing the previous definitions.

SCPM1-4.2.5 Command Container Counters

Name	Type	Description
TIE_A_Active	Fixed	Flag indicates whether TIE A or TIE B is online for the purpose of counting codeblocks (0=TIE B, 1=TIE A)
CommandCounter0	String	Name of telemetry point counter for TIE A valid codeblocks
CommandCounter1	String	Name of telemetry point counter for TIE B valid codeblocks
CommandCounter2	String	Name of telemetry point counter for VCID 16 valid critical commands
CommandCounter3	String	Name of telemetry point counter for VCID 17 valid critical command
CommandCounter4	String	Name of telemetry point counter for valid ISC commands
CommandCounter5	String	Name of telemetry point counter for valid PC commands
CommandCounter6	String	Name of telemetry point counter for valid GNCC commands
CommandCounter7	String	Name of telemetry point counter for valid CTC online commands
CommandCounter8	String	Name of telemetry point counter for valid CTC offline commands
CommandCounter9	String	Name of telemetry point counter for invalid ISC

		commands
CommandCounter10	String	Name of telemetry point counter for invalid PC commands
CommandCounter11	String	Name of telemetry point counter for invalid GNCC commands
CommandCounter12	String	Name of telemetry point counter for invalid CTC online commands
CommandCounter13	String	Name of telemetry point counter for invalid CTC offline commands
Pm1cmdTotalCLTUs	Fixed	Count of all CLTUs received
Pm1cmdValidCLTUs	Fixed	Count of valid CLTUs
Pm1cmdRejectCLTUs	Fixed	Count of invalid CLTUs
Pm1cmdTotalCodeblocks	Fixed	Count of all Codeblocks
Pm1cmdValidCodeblocks	Fixed	Count of valid Codeblocks
Pm1cmdRejectCodeblocks	Fixed	Count of invalid Codeblocks
Pm1cmdTotalTransferFrames	Fixed	Count of all Transfer Frames
Pm1cmdValidTransferFrames	Fixed	Count of valid Transfer Frames
Pm1cmdErrorTransferFrames	Fixed	Count of invalid Transfer Frames
Pm1cmdADFrames	Fixed	Count of Type AD Transfer Frames
Pm1cmdACFrames	Fixed	Count of Type AC Transfer Frames
Pm1cmdBCCMDS	Fixed	Count of Type BC Transfer Frames
Pm1cmdBDCMDS	Fixed	Count of Type BD Transfer Frames
Pm1cmdScCMDS	Fixed	Count of all Spacecraft Packets
Pm1cmdValidSpacecraftPkts	Fixed	Count of valid Spacecraft Packets
Pm1cmdErrorSpacecraftPkts	Fixed	Count of invalid Spacecraft Packets
Pm1cmdInstrCMDS	Fixed	Count of all Instrument Packets
Pm1cmdValidInstrumentPkts	Fixed	Count of valid Instrument Packets
Pm1cmdErrorInstrumentPkts	Fixed	Count of invalid Instrument Packets
Pm1cmdIgnoredCLTUs	Fixed	Number of CLTUs ignored while command processing is disabled.

SCPM1-4.3 Database Container Items

Name	Type	Description
DatabaseCmdConnected	Fixed	Command processing connected flag (0=not connected, 1=connected)
DatabaseCmdId	Fixed	Command identification flag (0=off, 1=on). When flag is on, command identification using the database occurs with each received command. If command processing is too slow, this flag should be set to off.
DatabaseDebug	Fixed	Debug flag (0=disabled, 1=enabled). When enabled, database debug messages are written to the server window.
DatabaseTlmConnected	Fixed	Telemetry initialization connected flag (0=not

		connected, 1=connected)
DatabaseVersionFound	Fixed	Version found flag (0= not found, 1=found)
TelemetryLoaded	Fixed	Telemetry loaded from database flag (0=not loaded, 1=loaded)

SCPM1-5.0 Displays

To access the displays for this module, first click on the center of the SCPM1 module in the project window. The following items will appear in a pop-up menu.

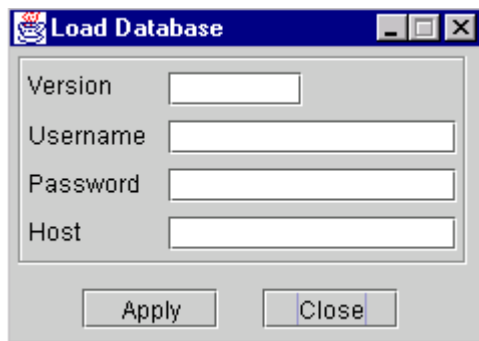
Module Pop-Up Menu Item	Description
Configure	Access the configuration menu for the module
Run-time	Access the Run-time menu for the module
Remove	Remove module from the project
About	Display generic module information

SCPM1-5.1 Configuration Menu

The configuration menu for the SCPM1 module contains two items.

Configuration Menu Item	Description
Load Database	Load the database information
Select Simulation Mode	Select IP or Serial Mode

SCPM1-5.1.1 Load Database



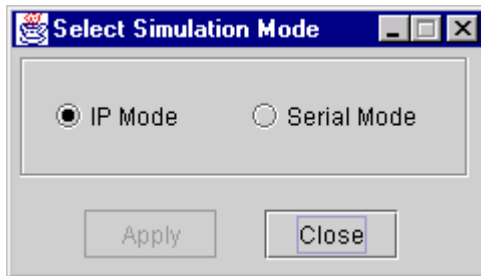
This display is used to specify the database to use to initialize telemetry information in the simulator. During run-time, this database will be accessed to identify received commands and generate event messages with command mnemonics. The Username and Password fields must be entered. When the **Apply** button is used, an attempt is made to access and read from the database.

Information about the success or failure of the database connection and telemetry initialization is reported to the event message log region.

Load Database Field	Description
Version	Optionally specifies a database version. If this field is left blank, the most recently loaded database will be used.
Username	Specifies the user account
Password	Specifies the password for the user account
Host	Optionally specifies a remote database host system. Both the local and remote systems must be properly configured to support remote database access. Refer to delivery package special operating instructions for more information. When this

	field is left blank, the local database is accessed.
--	--

SCPM1-5.1.2 Select Simulation Mode



This display is used to set the Simulation Mode. Depending on this mode, different input and output interface modules must be used in the project's design. Clicking the **Apply** button causes the action defined by the fields to take effect. Clicking the **Close** button closes the window with no additional action taken.

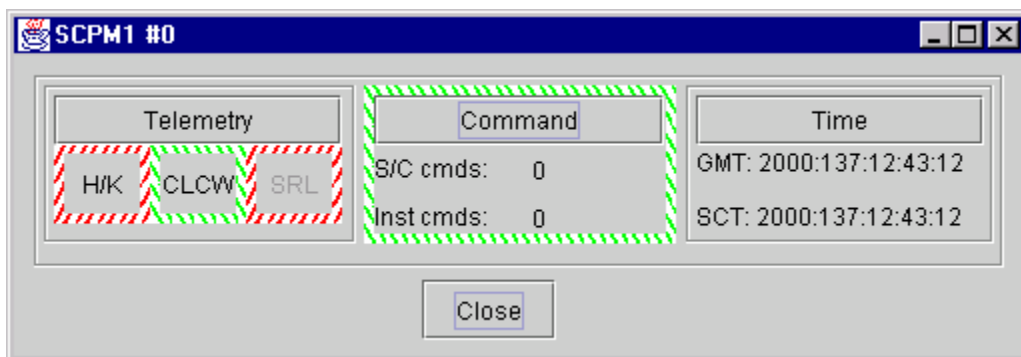
Mode Field	Description
IP Mode	The module will use IP protocol for input and output channels. See the IP module chapter for configuration of the IP modules.
Serial Mode	The module will use serial input and output channels for communication. See the Serial module chapter for configuration of the serial modules.

SCPM1-5.2 Run-time Menu

The Run-time menu for the SCPM1 module contains the following three items.

Run-time Menu Item	Description
Control	Request the module's main display
Resume	Resume the module's execution
Pause	Pause the module's execution

SCPM1-5.2.1 Main Display



This is the main display for the SCPM1 module, providing basic information about its current state, including the current GMT and spacecraft times, the number of valid spacecraft and instrument commands received, and the enabled/disabled status of command receipt and telemetry transmission. The latter are indicated by colored diagonal stripes around the appropriate box: the entire command box for command status and the telemetry channel boxes for each telemetry channel. Red stripes angling up and to the right indicate disabled, while green stripes angling down and to the right indicate enabled. When the module is using IP mode, the telemetry region buttons **H/K** and

CLCW are available and the **SRL** button is unavailable. When the module is using serial mode, only the **SRL** button is available. Clicking on the **Telemetry**, **Command**, and **Time** buttons in the main window provides access to subordinate displays.

SCPM1-5.2.1.1 Telemetry Menus


There are four buttons in the telemetry area of the main display: **Telemetry**, **H/K**, **CLCW** and **SRL**. Clicking the **Telemetry** button brings up a menu with the following items.

Telemetry Menu Item	Description
Modify Packet...	Modify packet data area on byte basis
Display Packet...	Display packet header and contents
Display Status	Display status of the telemetry channels
Control Packet...	Change the frequency of the packet transmission
Initiate Dump...	Set parameters to initiate dump packets
Display/Set Container Items...	Display and optionally modify container items
Display Container Buffer...	Display any container buffer
Modify CUC...	Modify the CCSDS Unsegmented Time Code

Clicking the **H/K**, **CLCW** or **SRL** channel buttons brings up a menu with the following choices.

Channel Menu Item	Description
Start	Enable telemetry transmission on the channel
Stop	Disable telemetry transmission on the channel

SCPM1-5.2.1.1.1 Modify Packet Display



This display allows the user to modify the data area of the packet on a byte or repeating byte basis. All of the display fields must be entered.

Data Entry Field	Description
APID	Application ID of the packet to be modified
Start Byte	First byte to change
Stop Byte	Last byte to change
Value (Hex)	Value to change byte(s) to, in hexadecimal

SCPM1-5.2.1.1.2 Telemetry Packet Display



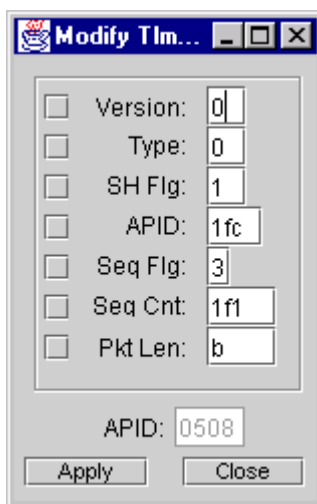
The screenshot shows a window titled "APID 0508 Packet Header Display". It is divided into two main sections: "Primary Header" and "Secondary Header".

Primary Header							Secondary Header					
Version	Type	SH Flg	APID	Seq Flg	Seq Cnt	Pkt Len	CCSDS	QL Flg	User Flgs	P-field	Epoch	Sec
0	0	1	1fc	3	a0	b	0	0	00	ae11	4fb3a554	

Below the headers are two buttons: "Dump" and "Edit".

At the bottom, there is a checkbox labeled "Use Secondary Key" which is currently unchecked. To its right is a text field labeled "APID:" containing the value "0508" and a secondary key field containing "0000". Below these are "Apply" and "Close" buttons.

The telemetry packet display shows the header and, optionally (by pressing the **Dump** button), the contents of the most recent telemetry packet sent with the given APID. The user must enter a valid value in the APID field and then click the **Apply** button before any other values will be reported. If there are multiple formats for an APID, click the "Use Secondary Key" box and enter the secondary key value in the space next to the APID. Clicking the **Dump** button will bring up a standard dump display with the contents of the packet. Clicking the **Edit** button will bring up the Modify Tlm Packet Header Display shown below. Clicking the **Close** button closes the window with no additional action taken.



The screenshot shows a window titled "Modify Tlm Packet Header". It contains a list of header fields, each with a checkbox to its left and a text input field to its right.

<input type="checkbox"/> Version:	0
<input type="checkbox"/> Type:	0
<input type="checkbox"/> SH Flg:	1
<input type="checkbox"/> APID:	1fc
<input type="checkbox"/> Seq Flg:	3
<input type="checkbox"/> Seq Cnt:	1f1
<input type="checkbox"/> Pkt Len:	b

Below the list is a text field labeled "APID:" containing the value "0508". At the bottom are "Apply" and "Close" buttons.

The Modify Tlm Packet Header display allows the user to modify fields in the packet header. Click on an enable box to the left of the field to enable modification of a specific header field. Clicking the **Apply** button puts the settings into effect. Clicking the **Close** button closes the display with no additional action taken.

The purpose of the Modify Tlm Packet Header display is to inject data values into transmitted packets that could be perceived as erroneous by the receiving system. Changing the APID and Pkt Len fields does not change the name or length of the buffer, only the data in the header fields.

Data Entry Field	Description
Version	CCSDS packet version number
Type	CCSDS packet type
SH Flg	Secondary header flag
APID	Application identifier (packet number)
Seq Flg	Sequence flag
Seq Cnt	Packet sequence counter
Pkt Len	Packet length for data zone (seven less than actual length)

SCPM1-5.2.1.1.3 Telemetry Status Display

The telemetry status display shows the enabled or disabled status and the number of packets transmitted for each of the two telemetry channels. Clicking the **Reset** button will reset the count of packets transmitted for that channel. Clicking the **Close** button closes this window with no additional action taken.

The Telemetry Status window displays two channels: H/K and CLCW. Each channel shows its status (Enabled), format (R/T), rate (8.00000000), and the number of packets transmitted (5324 for H/K, 1917 for CLCW). Each channel has a Reset button. A Close button is at the bottom.

Channel	Status	Format	Rate	Packets Transmitted
H/K	Enabled	R/T	8.00000000	5324
CLCW	Enabled	R/T	8.00000000	1917

SCPM1-5.2.1.1.4 Control Packet Display

The Control Packet window allows users to control telemetry packet generation. It includes fields for APID (0000) and Rate (000000.0), radio buttons for Enable and Disable, and a checkbox for Change Rate. Apply and Close buttons are at the bottom.

This display allows the user to control whether or not a telemetry packet is generated and optionally change the rate at which it is transmitted. Clicking the **Apply** button puts the settings into effect. Clicking the **Close** button exits the display.

Data Entry Field	Description
APID	Application ID of the packet to be modified
Enable	If flag is set, packet is formatted and sent
Disable	If flag is set, the packet is not transmitted
Change Rate	This box must be checked in order to change the rate field

SCPM1-5.2.1.1.5 Initiate Dump Packets

Dump Initiation

Packet APID

Packet Length

Interval

Start Address

Number of Words

☐ Dump Secondary Header

This display allows the operator to specify dump packet header values and initiate the sending of dump packets. The dump data words are kept in the container buffer SCPM1SCMemory. This buffer may be modified using the setBuffer directive on the directive line or within a scenario file. As soon as the "Number of Words" field has been specified, the dump packets are formatted and transmitted until the requested number of words have been dumped. Only one dump may be specified at a time.

Data Entry Field	Description
Packet APID	Application ID to store in dump packet header
Packet Length	Maximum size of dump packet. The last packet may be smaller.
Interval	Time between dump packet transmissions, in milliseconds
Start Address	Starting memory address
Number of Words	Number of words to be dumped
Dump Secondary Header	If this box is checked, the dump packets will have a secondary header containing a CCSDS unsegmented time code. If this box is not checked, the dump packets will not have a secondary header.

SCPM1-5.2.1.1.6 Display/Set Container Items

Display/Set Container Items

	Mnemonic	Value
<input type="checkbox"/>	EPC_BS_LATCHSTWD1	32767
<input type="checkbox"/>	EPC_BS_LATCHSTWD2	32767
<input type="checkbox"/>	TlmPacket0114Interval	64
<input type="checkbox"/>	TlmPacket0264Interval	64
<input type="checkbox"/>	TlmPacket0114Enabled	1
<input checked="" type="checkbox"/>	TlmPacket0264Enabled	1
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

This display allows the user to view and modify individual items from the SCPM1 module's container. Since telemetry points are stored as container items, telemetry points may be monitored and overwritten with this display. The first two items in the sample screen are telemetry points. To request an item for display or editing, enter its name in the mnemonic field and click the **Apply** button. If there are any problems with displaying or modifying items, error messages are sent to the event message area of the screen.

Multiple copies of this display are allowed, but each container item should only appear on one screen for properly updated values.

Field	Description
Checkbox	Click on this box to modify an item's value.
Mnemonic	This field identifies a container item for display. Refer to section "SCPM1-4.0 Container Items" for the container names of specific items. This field is not case-sensitive.
Value	If the associated checkbox is not checked, this is the current decimal value of the container item. If the checkbox is checked, this is a data entry field for the value of the item.

SCPM1-5.2.1.1.7 Display Container Buffer

This display may be used to display container buffers that do not have a customized display available for them. Enter the buffer name, offset, size and count and click on the **Apply** button. If there are problems displaying a buffer, error messages are sent to the event message area of the screen.

Pm1cmdPolyRemainderTbl Container Buffer Display

0000	0045	4f0a	5b1e	1451	7336	3c79	286d	6722	2366	6c29
0020	783d	3772	5015	1f5a	0b4e	4401	4603	094c	1d58	5217
0040	3570	7a3f	6e2b	2164	6520	2a6f	3e7b	7134	1653	591c
0060	4d08	0247	490c	0643	1257	5d18	3a7f	7530	6124	2e6b
0080	6a2f	2560	3174	7e3b	195c	5613	4207	0d48	0f4a	4005
0100	5411	1b5e	7c39	3376	2762	682d	2c69	6326	7732	387d
0120	5f1a	1055	0441	4b0e	5712	185d	0c49	4306	2461	6b2e
0140	7f3a	3075	7431	3b7e	2f6a	6025	0742	480d	5c19	1356
0160	1154	5e1b	4a0f	0540	6227	2d68	397c	7633	3277	7d38
0180	692c	2663	4104	0e4b	1a5f	5510	1e5b	5114	4500	0a4f
0200	6d28	2267	3673	793c	3d78	7237	6623	296c	4e0b	0144
0220	1550	5a1f	581d	1752	0346	4c09	2b6e	6421	7035	3f7a
0240	7b3e	3471	2065	6f2a	084d	4702	5316	1c59		

Buffername:

Offset: Size: Count:

Apply **Pause** Close

Addr Mode: ☐ Hex ☒ Dec

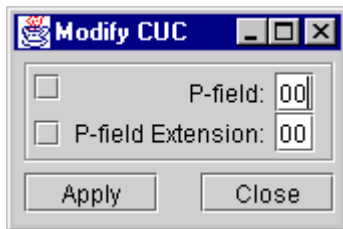
Data Mode: ☒ Hex ☐ Oct

If the buffer's contents are updated frequently, the **Pause** button may be used to display a "snapshot" of the buffer. (Buffer contents will continue to be updated offscreen.) The button's name is changed to **Cont**. To resume updates of the buffer, press the **Cont** button. Only one copy of this display may be active at a time. When switching from the

display of one buffer to another, it may be helpful to toggle the **Pause/Cont** button on and off to force a refresh of the buffer contents.

Field	Description
Buffername	This field identifies the container buffer for display. Refer to section "SCPM1-4.0 Container Items" for names of container buffers.
Offset	This field specifies the first byte to be displayed. This display is limited to 1400 data bytes at a time. This field is used with the count field to specify the portion of the buffer to display.
Size	Size of the data items to display (choices are byte, word, double)
Count	Number of data items to display (limited to 1400 total characters)
Addr Mode	Addresses of the data may be displayed in hexadecimal or decimal
Data Mode	Data may be displayed in hexadecimal or octal formats

SCPM1-5.2.1.1.8 Modify CCSDS Unsegmented Time Code



This display allows the user to modify the fixed fields of the CCSDS Unsegmented Time Code (CUC) in the telemetry packet headers. Clicking the enable boxes at left indicate whether or not the given field should be modified. Clicking the **Apply** button puts the settings into effect.

Data Entry Field	Description
P-field	P-field flags in the CUC. Enter hexadecimal value.
P-field Extension	Second byte of p-field, containing number of leap seconds since 1958. Enter hexadecimal value.

SCPM1-5.2.1.2 Command Menu

Clicking the **Command** button on the main display brings up the command menu.

Menu item	Description
Start	Enable command reception
Stop	Disable command reception
Display Status...	Enable/disable status, command counts, CLCWs by virtual channel
Modify Validation Criteria...	Allows modification of validation options
Display Spacecraft Packet...	Displays spacecraft virtual channel packet contents
Display Instrument Packet...	Displays instrument virtual channel packet contents
Override CLCWs	Edit the fields of the Command Link Control Words
Display Spacecraft Load...	Display the Spacecraft Memory Load Buffer

SCPM1-5.2.1.2.1 Display Command Status

The Command Status window displays the following information:

- Total CLTUs: 0
- Rejected CLTUs: 0
- Spacecraft Cmds: 0
- Instrument Cmds: 0
- BC Cmds: 0
- BD Cmds: 0
- Status: Enabled
- Spacecraft CLCW:

CWT	VER	STAT	COP	VCID	SP	RF	BITLCK	LCKOUT
0	0	0	1	0	0	0	0	0
- WAIT RETRANS FARMB SP REPVAL: 0 0 0 0
- Instrument CLCW:

CWT	VER	STAT	COP	VCID	SP	RF	BITLCK	LCKOUT
0	0	0	1	1	0	0	0	0
- WAIT RETRANS FARMB SP REPVAL: 0 0 0 0

Buttons: Reset (for each counter), Close.

When the “Display Status...” option is selected, this display is shown. The command status display shows command counters, command enabled or disabled status and the Command Link Control Words (CLCWs) for the spacecraft and instrument virtual channels. Clicking the **Reset** button sets the counter in that row to zero.

SCPM1-5.2.1.2.2 Modify Validation Criteria

The Modify Validation Criteria window displays the following options:

- ☒ CLTU Start and Tail Sequences
- ☒ BCH Error Code
- ☒ Transfer Frame Header Fields
- ☐ FARM (Valid Frame Sequence)
- ☒ User Command Packet Header
- ☐ All
- ☐ None

Buttons: Apply, Close.

When the “Modify Validation Criteria” option is selected, this screen is displayed. The operator may select any combination of the validation options. The operator may enable all of the validation tests by selecting the “All” option or disable all of the validation tests by selecting the “None” option. The **Apply** button is used to activate the new settings. The **Close** button is used to dismiss the screen without changes.

SCPM1-5.2.1.2.2.1 None Validation Option

Even when the “None” option is selected the following validation tests are performed.

- A received CLTU must be long enough to contain a start sequence, a single codeblock, and a tail sequence or it will be rejected and an error event message will be generated.
- A CLTU’s length will be checked to see there are enough bytes for a start sequence, tail sequence, and an even multiple of codeblocks. If there are extra bytes, they will be reported in a warning event message. The CLTU will then be processed as if there

were no extra bytes. The existence of “extra” bytes may indicate a problem with the source system’s formatting of the CLTU.

- The transfer frame header length field must report a value big enough to contain a transfer frame header and a single byte of data or it will be rejected and an error event message will be generated.
- The transfer frame header length field is compared to the actual length of the passed frame buffer. If there are more data bytes than are reported in the header, these bytes are compared to the fill data byte. If there are any “extra” bytes that are not fill data, a warning event message will be generated. The transfer frame will then be processed and the “extra” bytes will be ignored. The existence of “extra” non-fill bytes may indicate a problem with the source system’s formatting of the Transfer Frame.
- The transfer frame header VCID is used to determine whether the frame should be processed as a critical TIE command or passed to the spacecraft or instrument virtual channel Frame Acceptance and Reporting Mechanism (FARM). The VCID must match one of the four expected VCID values stored in the container. When a VCID does not match any of the expected values, the transfer frame is rejected and an error event message is generated.

SCPM1-5.2.1.2.2.2 Validation of CLTU Start and Tail Sequences

Since a received CLTU must contain a valid start and tail sequence to be recognized by the software, disabling validation of these items is not an option. Rather, the software will report appropriate event error messages if the start sequence cannot be located, or if the start sequence is located but the tail sequence is not found.

SCPM1-5.2.1.2.2.3 BCH Error Code Validation Option

When Bose-Chaudhuri-Hocquenghem (BCH) Error Code validation is enabled, the parity byte of each received codeblock is compared to the parity value calculated from the codeblock data area. If a parity comparison fails, both parity bytes are reported in an error event message and the current CLTU is rejected.

SCPM1-5.2.1.2.2.4 Transfer Frame Header Validation Option

Validation of the mode, SCID, VCID, frame length and frame sequence count fields of the transfer frame header could result in error status codes being reported in the CLCW for the frame’s virtual channel. Therefore validation of those fields is done during FARM validation and not as part of the transfer frame validation. When transfer frame validation is enabled, the following validations are done.

- The transfer frame header version field must contain 0 or the frame is rejected and an error event message is generated.
- The transfer frame header spare field must contain 0 or the frame is rejected and an error event message is generated.

SCPM1-5.2.1.2.2.5 Farm (Valid Frame Sequence) Validation Option

When FARM validation is enabled, all fields related to the setting of the CLCW are checked. FARM validation includes the following tests:

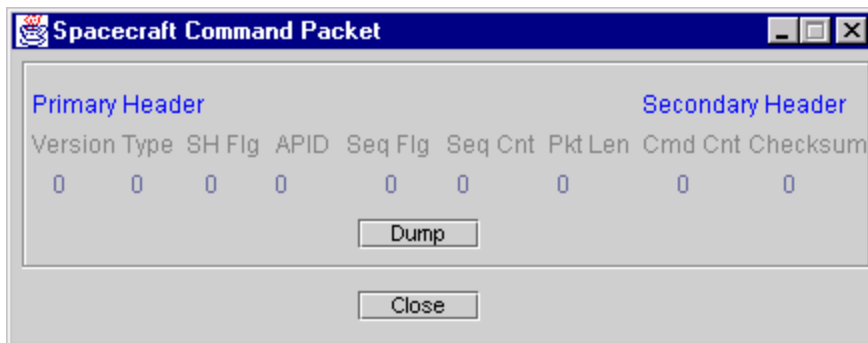
- The transfer frame header length is tested to be within the range specified in the ICD. If the length is invalid, the “Incorrect Frame Length” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- The transfer frame header length is compared to the actual length of the received buffer. If the frame contains fewer bytes than reported in the header, the “Incomplete Frame” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- The transfer frame header mode flags are checked. If the mode is “AC”, the “Illegal frame type (Type-AC)” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- If the transfer frame header mode flags specify “BC”, the frame data is checked for a valid transfer frame control command. If the frame data does not contain a valid frame control command, the “Illegal Type-BC frame” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- The transfer frame header VCID field is compared to the VCID field from the FARM’s CLCW. If the VCID fields do not match, the “Illegal VCID” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- If the transfer frame header SCID field does not match the PM-1 SCID stored in container point Pm1cmdSCID, the “Illegal SCID” status is stored in the CLCW, the frame is rejected, and an error event message is generated.
- The transfer frame header sequence field is subjected to the FARM-1 protocol and the CLCW flags, FARM-B Counter, and Report Value fields will be updated accordingly. Event messages are generated for every transfer frame that fails the acceptance test.

SCPM1-5.2.1.2.2.6 User Command Packet Header Validation Option

When packet validation is enabled, fields in the packet header will be validated as specified in the EOS PM-1 Spacecraft to Ground ICD.

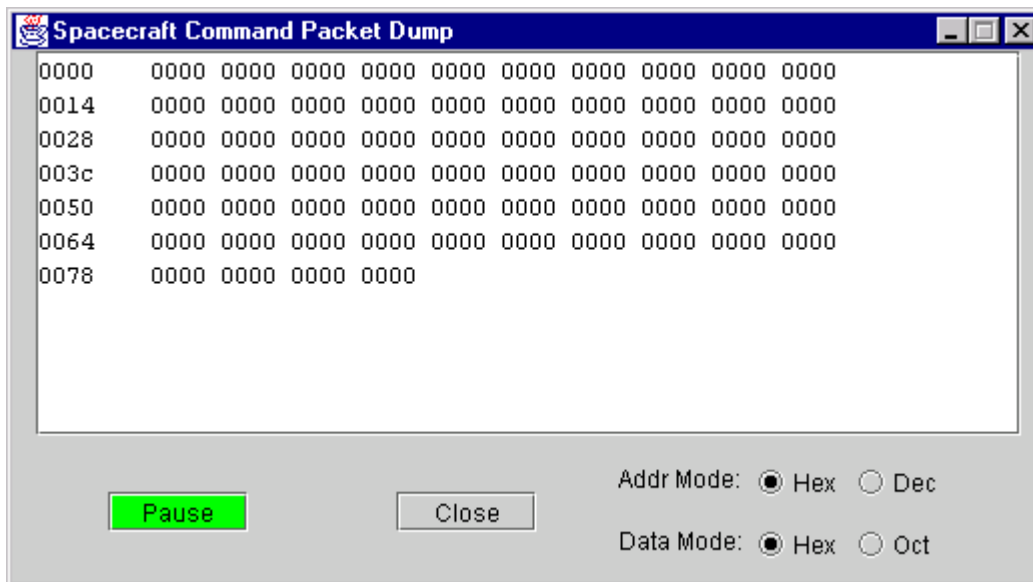
SCPM1-5.2.1.2.3 Display Spacecraft Packet

This display shows the spacecraft virtual channel command packet header. A dump of the full packet buffer may be requested by pressing the **Dump** button.



Spacecraft Command Packet

Primary Header					Secondary Header				
Version	Type	SH Flg	APID	Seq Flg	Seq Cnt	Pkt Len	Cmd Cnt	Checksum	
0	0	0	0	0	0	0	0	0	



Spacecraft Command Packet Dump

0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0014	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0028	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
003c	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0050	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0064	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0078	0000	0000	0000	0000						

Addr Mode: ☒ Hex ☐ Dec
Data Mode: ☒ Hex ☐ Oct

The Dump address region may be displayed in decimal or hexadecimal. The data region may be displayed in hexadecimal or octal. Since this display normally updates as the buffer contents are changed, use the **Pause** button to freeze the current contents. Use of the **Pause** button does not affect command packet reception. When the **Pause** button has been used, the button's label is changed to **Cont** (for continue). Press the **Cont** button to resume screen updates. Note that the display is updated to show the last command packet received. Intermediate packets received while the display was frozen can not be displayed.

SCPM1-5.2.1.2.4 Display Instrument Packet

This display shows the instrument virtual channel packet header. Optionally, a dump of the full packet buffer may be requested. They are very similar in appearance and function to the spacecraft packet header and packet dump displays that are described in the previous section.

SCPM1-5.2.1.2.5 Override CLCWs

This display shows the Command Link Control Words (CLCWs) for the two virtual channels broken out into bit fields. Any field may be overridden by checking the field's

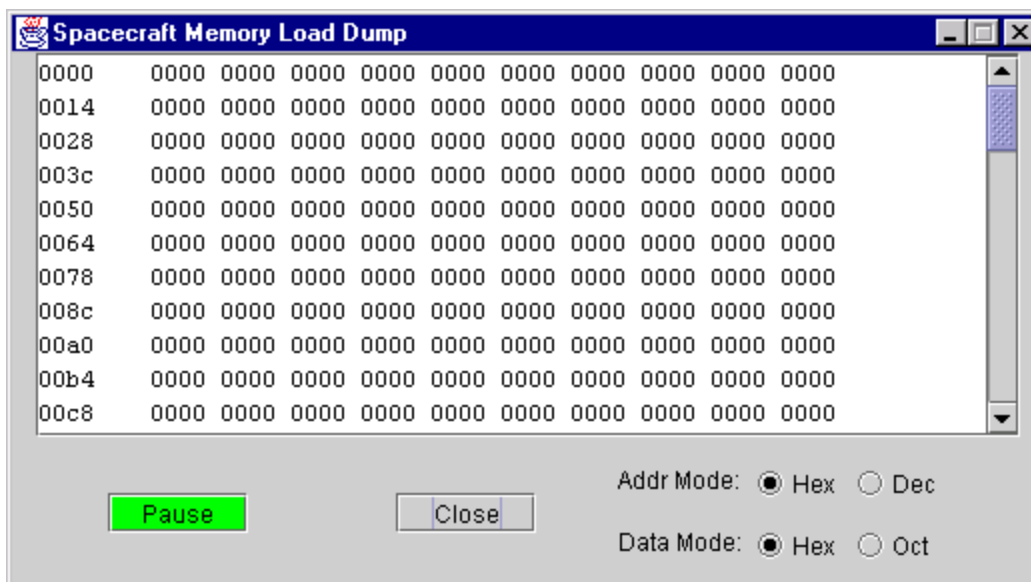
selection box and then typing in the new decimal value. The new value takes effect when the **Apply** button is pressed. Note that since these are bit fields, attempts to assign values that are too large will result in truncation of the value. Review changes on the CLCW portion of the Command Status display. Event messages also show the values assigned.

Spacecraft CLCW		Instrument CLCW	
<input type="checkbox"/> CWT	0	<input type="checkbox"/> CWT	0
<input type="checkbox"/> VER	0	<input type="checkbox"/> VER	0
<input type="checkbox"/> STAT	0	<input type="checkbox"/> STAT	0
<input type="checkbox"/> COP	1	<input type="checkbox"/> COP	1
<input type="checkbox"/> VCID	0	<input type="checkbox"/> VCID	1
<input type="checkbox"/> SP1	0	<input type="checkbox"/> SP1	0
<input type="checkbox"/> RF	0	<input type="checkbox"/> RF	0
<input type="checkbox"/> BITLCK	0	<input type="checkbox"/> BITLCK	0
<input checked="" type="checkbox"/> LCKOUT	1	<input type="checkbox"/> LCKOUT	0
<input type="checkbox"/> WAIT	0	<input type="checkbox"/> WAIT	0
<input type="checkbox"/> RETRANS	0	<input type="checkbox"/> RETRANS	0
<input type="checkbox"/> FARMB	0	<input type="checkbox"/> FARMB	0
<input type="checkbox"/> SP2	0	<input type="checkbox"/> SP2	0
<input type="checkbox"/> REPVAL	0	<input type="checkbox"/> REPVAL	0

CLCW Field	Description
CWT	Control Word Type (1 bit)
VER	Version (2 bits)
STAT	Status (3 bits)
COP	Command Operations Procedure (COP) in Effect (2 bits)
VCID	Virtual Channel Identification (6 bits)
SP1	Spare field 1 (2 bits)
RF	No RF Available Flag (1 bit)
BITLCK	No Bit Lock (1 bit)
LCKOUT	Lockout Flag (1 bit)
WAIT	Wait Flag (1 bit)
RETRANS	Retransmission Flag (1 bit)
FARMB	FARM-B Counter (2 bits)
SP2	Spare field 2 (1 bit)
REPVAL	Report Value (8 bits)

SCPM1-5.2.1.2.6 Display Spacecraft Load

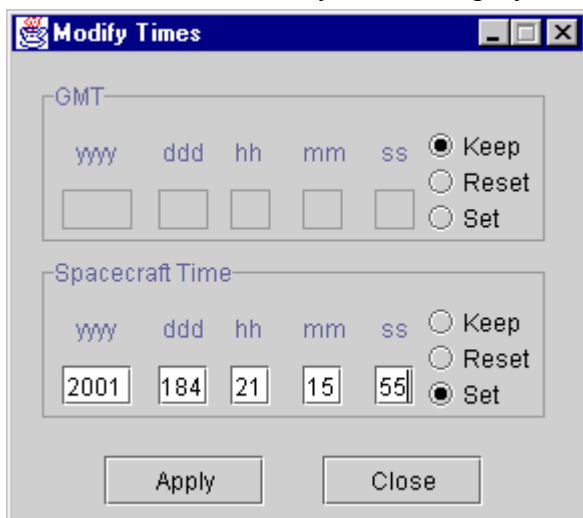
When the “Display Spacecraft Load...” option is selected, the buffer containing the accumulated spacecraft load packet data is displayed.



SCPM1-5.2.1.3 Time

The time area of the main display shows the current Greenwich Mean Time (GMT) and spacecraft time fields. The GMT is a reflection of the simulated time of the SCPM1 module, i.e., what time will be used to model external events (transitions to day or night, for example) within the module. It is not currently used. The spacecraft time is the time that the spacecraft thinks it is. In particular, it is the time (in the appropriate format) that goes into the secondary header of the telemetry packets generated by the SCPM1 module. Clicking the **Time** button brings up a menu with one selectable item, “Modify Times...”.

SCPM1-5.2.1.3.1 Modify Times Display



This display allows the user to set the GMT or spacecraft time manually, retain the time currently being used, or reset the time to the current system time.

Clicking the **Apply** button will cause the requested actions to take effect.

Clicking the **Close** button closes the window with no further action taken.

Field	Description
yyyy	Year
ddd	Day of year

hh	Hour of day
mm	Minute of hour
ss	Second of minute
Keep	Don't update time
Reset	Change time to current system time
Set	Set time to value supplied

SCPM1-5.3 Remove

Clicking the “Remove” option from the module pop-up menu causes this module to be removed from the project. This option is not available during run-time.

SCPM1-5.4 About

Clicking the “About” option from the module pop-up menu requests a display that lists generic information about the module such as the numbers of input and output channels.

SCPM1-6.0 Special Operating Instructions

SCPM1-6.1 Serial Mode Operation

In order to run the SCPM1 module in serial mode select serial mode from the Select Simulation Mode Display during project configuration. SCPM1 input channel 2 and output channel 3 must be linked to serial input and serial output modules. Serial I/O cards are required on the server platform.

SCPM1-6.2 Triggering Scenarios with Commands

A powerful feature of the SCPM1 module is to be able to automatically trigger the execution of specified scenario files when specific commands are recognized from the database. The project must contain a scenario module. The output channel from the scenario module must be connected to input channel 1 of the SCPM1 module.

SCPM1-6.2.1 Using the Default Scenario Directory

Create a file named **Command-Scenario.txt** in the release's scenario directory. (The scenario directory should be at the same level as the properties, elog and save directories.) The scenario files to be executed should be placed in this directory. The command trigger definition file is read immediately after the database is loaded. The trigger information is stored in memory. Event messages will be generated for any invalid command mnemonics and any invalid scenario filenames in the definition file.

Format of Command-Scenario.txt File
<p>Command-scenario pairs are specified by the following format:</p> <pre>command mnemonic scenario filename</pre> <p>One pair is specified per line with the " " character as the delimiter. Leading and trailing spaces and tab characters will be removed so these characters may be used to align the data. The scenario filename may be specified as a full or relative pathname. Relative</p>

pathnames will start from the scenario directory. Each command mnemonic should only appear in the definition file once.

Any line starting with a semicolon ";" in column one is ignored as a comment.

Blank lines are also ignored.

SCPM1-6.2.2 Using an Alternate Scenario Directory

If a user wishes to use an alternate set of scenario files, place them in a specific directory on the disk, for example, D:\My-Scenarios. Place the command trigger definition file, Command-Scenario.txt, in this directory as well.

Every reference to a scenario file, from within the command trigger definition file or from within a scenario file MUST use the file's fully specified path name. For example, an entry in the definition file might be:

```
CDH_EXECUTE_TIENOP | D:\My-Scenarios\tienop.txt
```

If any scenario file calls tienop.txt, the format for the calling statement within the scenario file is

```
Start scenario D:\My-Scenarios\tienop.txt
```

When the simulator is started, the default command trigger definition file will be read from the default directory. To force replacement of the default trigger information with the alternate definition file send directives similar to the following to the SCPM1 module. Do not use quotes around the alternate directory name and do not forget the ending slash.

```
Set scenarioPath D:\My-Scenarios\  
Set readScenFile 0
```

These set directives must be done each time the simulator is started. To make this easier, place both directives in a scenario file in the alternate directory. After the simulator is running, use the Scenario module GUI file browser to navigate to the alternate directory and execute this file.

SCPM1-6.2.3 Update/Replace Command Trigger Definitions

During run-time the operator may request that the Command-Scenario.txt definition file be read in again replacing the previous definitions. On the directive line to the SCPM1 module, enter the following. Check the event message log for status and error messages.

```
Set ReadScenFile 0
```

Internet Protocol (IP) Modules

IP-1.0 Overview

The Input and Output Internet Protocol (IP) modules receive/send data packets from/to other sources/destinations using one of several IP types (TCP/IP-Client, TCP/IP-Server, UDP Multicast, or UDP Unicast). The Input IP module receives data from an external project and passes that data on to another module. The Output IP module receives data from a module and passes that data to another module or external project. Both the Input and Output IP modules are discussed in this one section because of their great similarity.

IP-2.0 Inputs

The Input IP module does not have any input channels. The Output IP module has a single input channel, which is listed below.

Channel	Data expected	Validation performed	Processing performed
1	Packets	None	Data is received from another module and sent to an external destination.

IP-3.0 Outputs

Both the Input IP and Output IP modules have a single output channel.

Channel	Description
1	Input IP module sends received data to another module. Output IP module sends transmitted data to another module (usually Log Module).

IP-4.0 Container Items

IP module container items are not accessible via operator directives, so they are not listed here.

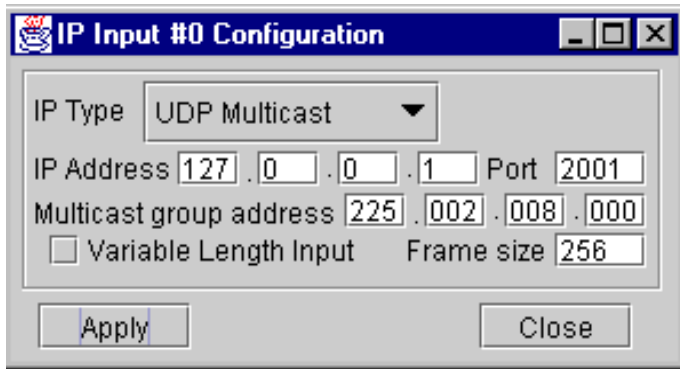
IP-5.0 Displays

To access displays for a module, click in the center of the module in the project window. The following pop-up menu choices will appear. The “Remove” option can be used during project design to remove this module. The “Configure” option should be used prior to running the project and is unavailable at run-time. The Run-time option is available only when the project is running.

Module Pop-Up Menu Item	Description
Configure	Access the configuration display
Run-time	Access the Run-time menu for the module
Remove	Remove module from the project
About	Display generic module information

IP-5.1 Configuration

Clicking on the Input IP module pop-up menu “Configure” item produces the following display.

A screenshot of a Windows-style dialog box titled "IP Input #0 Configuration". The dialog has a blue title bar with standard minimize, maximize, and close buttons. Inside, there is a "IP Type" dropdown menu currently set to "UDP Multicast". Below this are four text input fields for "IP Address" (127, 0, 0, 1) and "Port" (2001). Underneath the IP address fields is another set of four text input fields for "Multicast group address" (225, 002, 008, 000). To the left of these fields is a checkbox labeled "Variable Length Input" which is currently unchecked. To the right of the multicast address fields is a "Frame size" input field containing the value 256. At the bottom of the dialog are two buttons: "Apply" on the left and "Close" on the right.

The default settings for the Input IP module are shown. There are 4 possible IP Types: UDP Multicast, TCP/IP-Client, TCP/IP-Server, and UDP Unicast. The IP Type may be changed by selection from a drop-down menu. When the UDP Multicast choice is selected, the Multicast group address field is activated.

Enter the IP address of the Input IP module in the IP address field.

Enter the port number for the incoming data in the Port field.

Enter the Multicast group address if using the UDP Multicast IP type. You must change the multicast group address from the default value if using the UDP Multicast IP type. The multicast group address range is 224.0.0.1 to 239.255.255.255.

For fixed length input/output data, enter the fixed size in bytes in the Frame size field. If this size is larger than the actual data, the additional bytes will be filled with binary zero. If the frame size is smaller than the actual data size, the data bytes will be truncated to the specified frame size. The specified number of bytes will be passed to the next module or external destination.

For variable length input/output data, check the Variable Length box. The actual length of each data packet will be used, without truncation or padding. When this option is selected, the Frame size field is desensitized.

Click the **Apply** button to save your settings. Click the **Close** button to dismiss the Configuration display without making any changes.

The Output IP module may be configured in similar fashion.

IP-5.2 Run-time

Click on the module pop-up menu “Run-time” option to request the Run-time Menu.

Run-time Menu Item	Description
Resume	Restart the IP module
Pause	Stop the IP module
Show Raw Packet	Request Raw Packet Display
Show Status	Request Status Display

IP-5.2.1 Resume

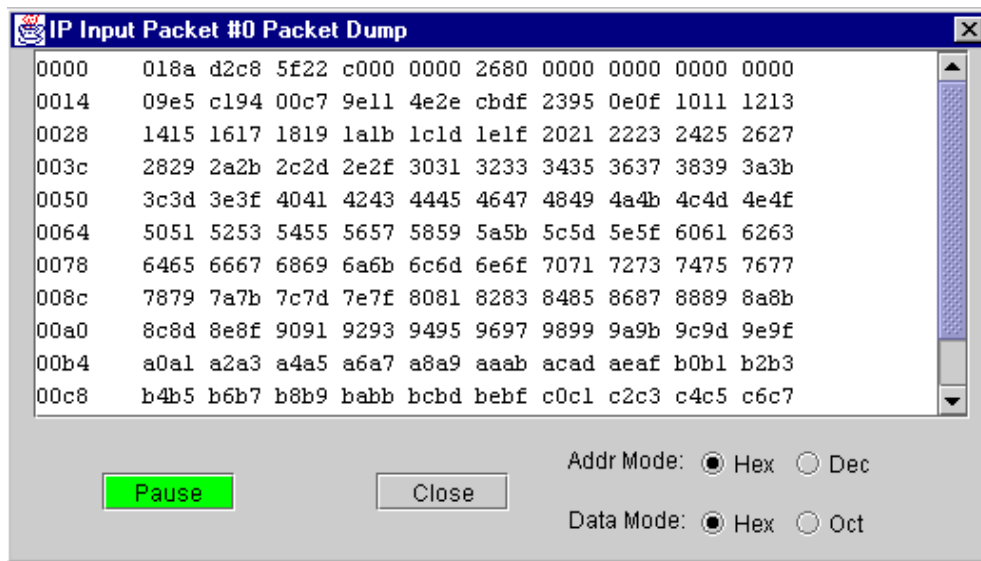
After an individual module has been stopped, select “Resume” from the Run-time Menu to restart the module. The color around the module’s border will change from red-striped (indicates stopped state) to green-striped (indicates run state).

IP-5.2.2 Pause

Select “Pause” from the Run-time Menu to stop the IP module’s processing. The color around the module’s border will change from green-striped (indicates run state) to red-striped (indicates stopped state). Once the module has been stopped, the “Configure” option of the module pop-up menu is available again and the module may be reconfigured. The Resume option must then be used to return to run mode.

IP-5.2.3 Show Raw Packet

Select “Show Raw Packet” from the Run-time Menu to show raw packets received by the module. This produces a display similar to that shown below.

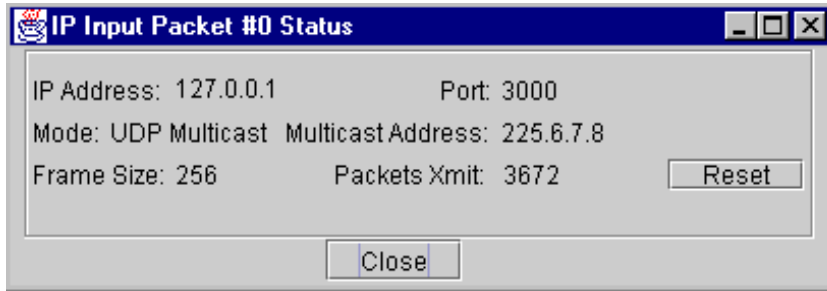


The address region may be displayed in decimal or hexadecimal by clicking on the respective radio button. Likewise, the data region may be displayed in hexadecimal or octal. Since this display updates as the buffer contents are changed, the **Pause** button may be used to freeze the current contents. Use of the **Pause** button does not affect data transmission or reception. When the **Pause** button has been used, its label is changed to **Cont** for continue. Press the **Cont** button to resume screen updates. Note that the

display will update with the last packet processed. Packets not shown while the display was frozen can not be displayed. Click the **Close** button to dismiss the display.

IP-5.2.4 Show Status

Select the “Show Status” item to request the module’s status. This produces a display similar to that shown below.



This display shows the Input IP module’s address, port number, IP type, multicast group address (if the IP type is UDP Multicast), Frame size, and number of packets received. If variable length items are being received, the Frame size field will show the most recent size. The **Reset** button may be clicked to reset the number of packets received count. Click the **Close** button to dismiss the display. The Output IP module’s Status Display is very similar.

IP-5.3 About

Selecting the “About” option from an IP module pop-up menu produces a display that lists the module’s number of inputs and outputs, whether directives are allowed, names of authors and the version number.

IP-6.0 Special Operating Instructions

There are no special operating instructions for this release.

Log (LOG) Module

LOG-1.0 Overview

The Log (LOG) module is responsible for writing data received on its input port to a specified log file.

Note: Viewing or printing of log files may be accomplished by means of an external program. The software used must be capable of displaying binary data in an ASCII representation. The shareware utility, Hexedit, which is available over the Internet from Alexander Reidel Informations-Systeme, is one such program.

LOG-2.0 Inputs

Ch	Data expected	Validation performed	Processing performed
1	bytes	None	Received log data is written into the log file.

LOG-3.0 Outputs

The Log module does not have any output channels.

LOG-4.0 Container Items

Log module container items are not accessible via operator directives, so they are not listed here.

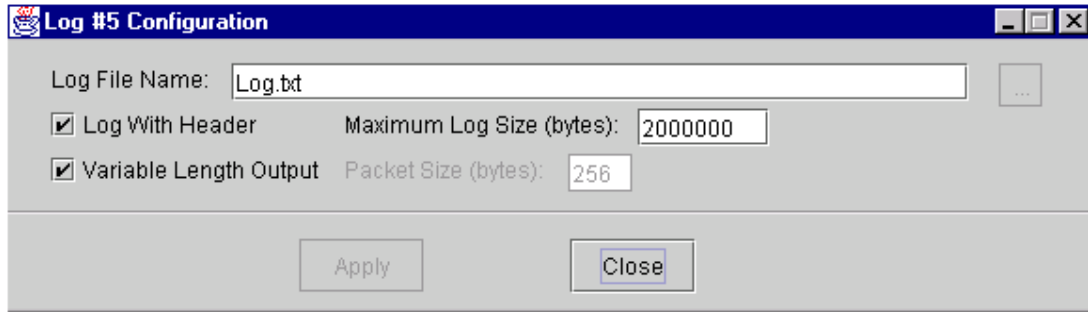
LOG-5.0 Displays

To access displays for this module, click in the center of the Log module in the project window. The following pop-up menu choices will appear. The "Remove" option can be used during project design to remove this module. The "Configure" option should be used prior to running the project and is unavailable at run-time. The Run-time option is available only when the project is running.

Module Pop-Up Menu Item	Description
Configure	Access the configuration display
Run-time	Access the Run-time menu for the Log module
Remove	Remove the Log module from the project
About	Display Information about the module

LOG-5.1 Configuration

Selecting the "Configure" pop-up menu option produces a display similar to the following screen.



LOG-5.1.1 Log File Name

The Log File Name specifies where the log data is written. If this file already exists, its data will be overwritten. If there is more than one Log module in a project, they cannot write to the same log file.

LOG-5.1.2 Maximum Log Size

The Maximum Log Size in bytes limits the amount of storage used for logging. When this maximum is reached, the log file is closed and an event message is generated.

LOG-5.1.3 Packet Size

The Packet Size in bytes defines the size of the data buffer to be written to the log file. A packet size that is smaller than the actual data buffer received will result in truncation of the data that is logged. A packet size that is larger than the actual data buffer received will be zero filled to the packet size and then written to the log file.

LOG-5.1.4 Log With Header

When the Log With Header box has been checked, all log records will begin with a log header of ten bytes. This header consists of eight bytes of system time followed by two bytes of data length. The following example shows two CLCW packets. The header in each packet has been circled for clarity. When the Log With Header box is unchecked, all records will be written without a header.

hexedit1															
00000000	01	BF	85	59	4F	6D	6A	A0	00	20	02	8C	8C	EA	DA 13 00 00 00 00 26
00000015	80	00	00	00	00	00	00	00	00	00	00	00	66	82	00 00 01 01 00 00 00
0000002A	01	BF	85	59	4F	7F	C0	E0	00	20	02	8C	8C	EA	DA 13 00 00 00 00 26
0000003F	80	00	00	00	00	00	00	00	00	00	00	00	66	82	00 00 02 01 04 00 00

LOG-5.1.5 Variable Length Output

When the Variable Length Output box has been checked, varying length records are written to the log file. No truncation or padding of received data is done. When this field is checked, the packet size field is desensitized.

LOG-5.2 Run-time

Clicking the “Run-time” option of the Log module pop-up menu produces a Run-time menu. There are three items in the menu list.

Log Run-time Menu Item	Description
Resume	Start the Log module again after a stop
Pause	Stop the Log module
Show Status	Show information on the log file

LOG-5.2.1 Resume

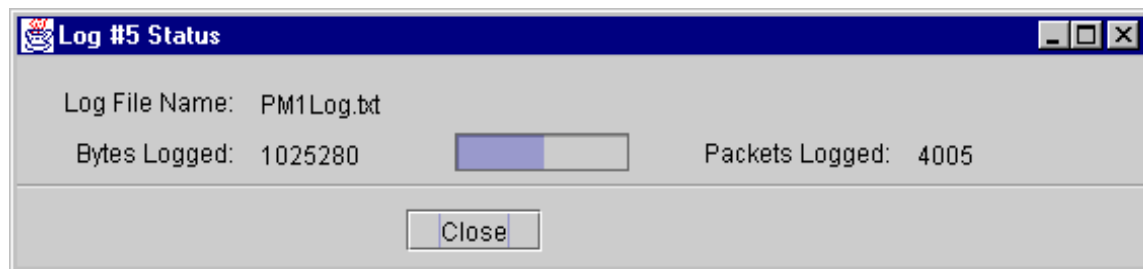
The Log module may be restarted after being stopped. The specified log file will be created and possibly overwritten. All of the associated counters will start over from zero.

LOG-5.2.2 Pause

The Log module may be stopped independently of the other modules in the project. After it has been stopped, the user may return to the Configuration screen and change the Log File Name, Packet Size or Maximum Log Size.

LOG-5.2.3 Show Status

When the “Show Status” option is selected from the Run-time Menu, a screen like the following is displayed. The bar in the center of the screen shows the percentage of the log area in use. The dark blue portion of the bar represents the logged data.



LOG-5.3 About

Selecting the “About” option from the module pop-up menu produces a display that lists the module’s number of input links, number of output links, whether directives are allowed, names of authors and the version number.

LOG-6.0 Special Operating Instructions

There are no special operating instructions for this release.

Serial Input (SI) Module

SI-1.0 Overview

The Serial Input (SI) module provides the capability to receive serial data through a port on a serial card in the host computer and to pass the data received to other modules.

SI-2.0 Input

The SI module does not have any input channels.

SI-3.0 Output

Channel	Description
1	Data received from the serial port is passed on this channel

SI-4.0 Container Items

The SI module's container items are not accessible via operator directives, so they are not listed here.

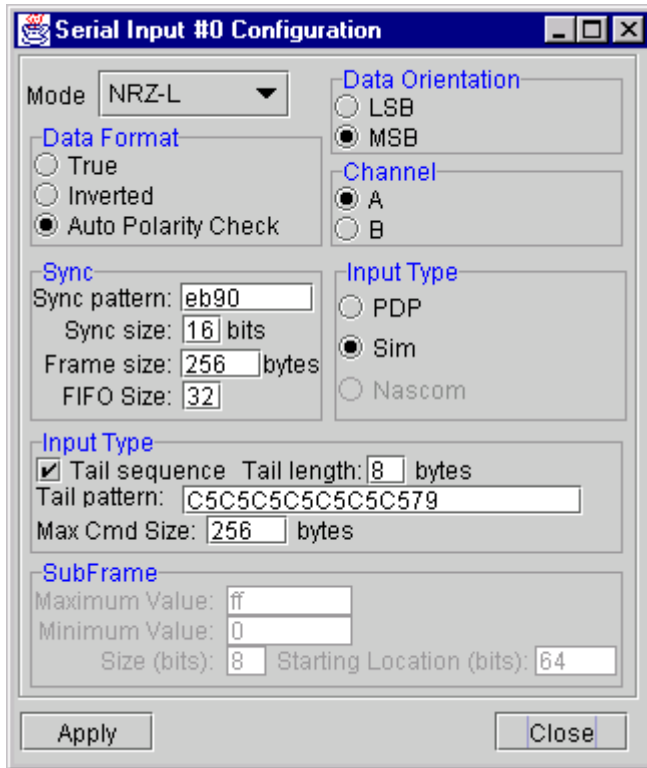
SI-5.0 Displays

To access displays for this module, click in the center of the SI module in the project window. The following module pop-up menu choices will appear. The "Configure" and "Remove" options are only available during project design. The "Run-time" option is only available when the project is running.

Module Pop-up Menu Item	Description
Configure	Access the Serial Input configuration window
Run-time	Access the module's run-time menu
Remove	Remove the module from the project
About	Display generic module information

SI-5.1 Configuration

Select the "Configure" item from the module pop-up menu to access the configuration window for the Serial Input module.



Serial Input #0 Configuration

Mode: **NRZ-L**

Data Orientation
☐ LSB
☒ **MSB**

Data Format
☐ True
☐ Inverted
☒ **Auto Polarity Check**

Channel
☒ **A**
☐ B

Sync
 Sync pattern: **eb90**
 Sync size: **16** bits
 Frame size: **256** bytes
 FIFO Size: **32**

Input Type
☐ PDP
☒ **Sim**
☐ Nascom

Input Type
☒ Tail sequence Tail length: **8** bytes
 Tail pattern: **0505050505050579**
 Max Cmd Size: **256** bytes

SubFrame
 Maximum Value: **ff**
 Minimum Value: **0**
 Size (bits): **8** Starting Location (bits): **64**

Apply **Close**

Parameter	Description
Mode	Select the decode method of the input stream from NRZ-L, NRZ-M, NRZ-S, BIO-L, BIO-M, or BIO-S.
Data Orientation	Select LSB if the data stream is received with the least significant bit first. Select MSB if the data stream is received with the most significant bit first.
Data Format	Select True if the polarity of the data stream is normal. Select Inverted if the polarity of the data stream is inverted. Select Auto Polarity Check (APC) if the polarity is not known.
Channel	Select channel A or channel B for the operation.
Sync Pattern	Enter the synchronization pattern in hexadecimal format for the serial I/O card to receive data. (four digit maximum)
Sync Size	Enter the size of the synchronization pattern in bits.
Frame Size	Enter number of bytes per frame to be received. (five digit maximum)
FIFO Size	Enter the number of buffers for the FIFO.
Input Type	Select the PDP button if the input stream is telemetry. Select the Sim button if the input stream is command.
Tail Sequence	If the command bitstream has a tail sequence, check this box.
Tail Length	Enter the command tail sequence size in bytes.
Tail Pattern	Enter the command tail sequence pattern in hexadecimal digits.
Max Cmd Size	Enter the maximum command size expected in bytes.
Maximum Value	Enter telemetry subframe's maximum value.

Minimum Value	Enter telemetry subframe's minimum value.
Size	Enter telemetry subframe size in bits
Starting Location	Enter the starting location for the telemetry subframe in bits.

Click **Apply** button to configure any changes. Click **Close** button to dismiss the display.

SI-5.2 Run-time

Click the module pop-up menu “Run-time” option to access the Run-time menu with the following choices.

Run-time Menu Item	Description
Display Status	Show the Status window of the Serial Input module
Display Dump Menu	Show options for the Dump Display
Resume	Restart the module
Pause	Stop the module

SI-5.2.1 Display Status

This display shows the number of frames and sub-frames that have been received and dropped. It also shows the current configuration settings. Please refer back to the table in section SI-5.1 for descriptions of the settings.

Search Mode and Sub Frame status fields are only applicable when receiving telemetry data.

Click any **Reset** button to change its associated counter to zero.

Click the **Close** button to dismiss the display.

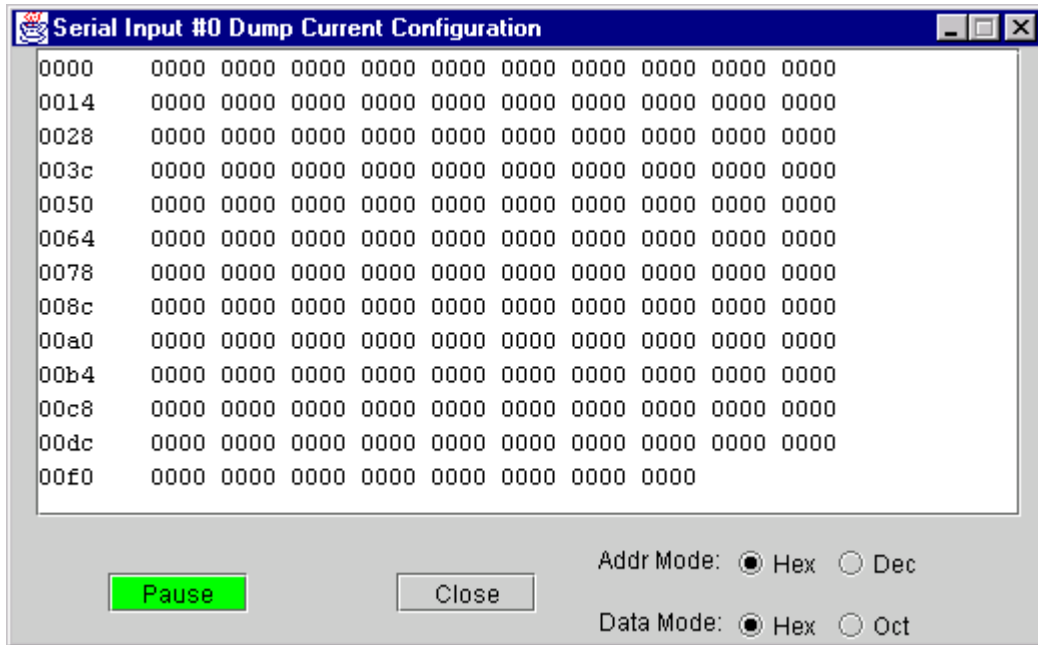
SI-5.2.2 Display Dump Menu

Select the “Display Dump” option to view the available dump options.

Display Dump Menu Item	Description
Display Buffer Current Configuration	The input data buffer is displayed as received.
Display Buffer True Format	The input data buffer is converted to true format and then displayed.

SI-5.2.2.1 Display Buffer Current Configuration

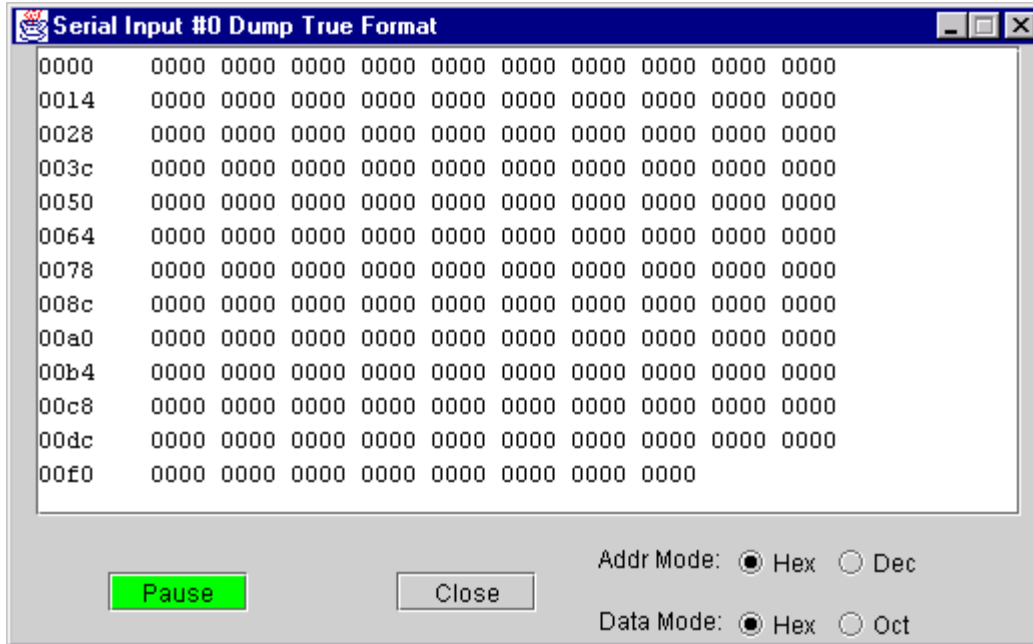
When this option is selected the data received from the serial I/O port is displayed exactly as it is received.



Button	Description
Addr Mode	Select Hex to display the memory address in hexadecimal format Select Dec to display the memory address in decimal format
Data Mode	Select Hex to display data in hexadecimal format Select Oct to display data in octal format
Pause	Pause updating the data contained in the window. The button name changes to Cont .
Cont	Continue updating a previously paused display. The button name changes to Pause .
Close	Close the window

SI-5.2.2.2 Display Buffer True Format

When this option is selected the data received from the serial I/O port is displayed in true format. If necessary, the input data is converted to NRZ-L mode, with MSB orientation and normal polarity. It has the same button controls as described in the previous section.



SI-5.2.3 Resume

After an individual module has been stopped, select “Resume” from the Run-time menu to restart the module. The color around the module’s border will change from red-striped (indicates stopped state) to green-striped (indicates run state).

SI-5.2.4 Pause

Select the “Pause” option from the Run-time menu to temporarily stop the Serial Input module’s processing. The color around the module’s border will change from green-striped (indicates run state) to red-striped (indicates stopped state). The Serial Input module can be re-configured by selecting the “Configure” option of the module pop-up menu. To return to run mode, select the “Resume” option.

SI-5.3 Remove

Select this option to remove the Serial Input module from the project.

SI-5.4 About

Selecting the “About” option from the module pop-up menu produces a display that lists the number of input channels, number of output channels, whether directives are allowed, names of authors and the module’s version number.

SI-6.0 Special Operating Instructions

There are no special operating instructions for this release.

Serial Output (SO) Module

SO-1.0 Overview

The Serial Output (SO) module provides the capability to transmit serial data through ports on a serial card in the host computer.

SO-2.0 Input

Channel	Description
1	Data to be transmitted through the serial port.

SO-3.0 Output

Channel	Description
1	Data being transmitted through the serial port.

SO-4.0 Container Items

The module's container items are not accessible via operator directives, so they are not listed here.

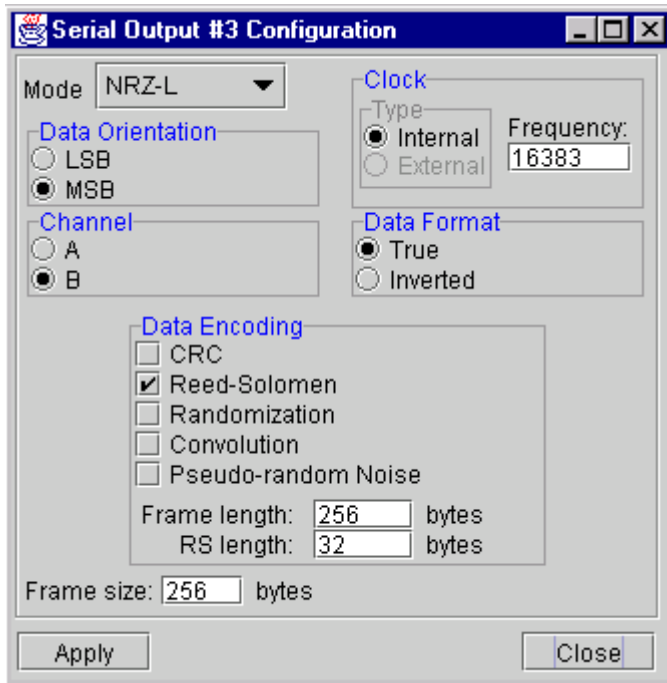
SO-5.0 Displays

To access the displays for this module, click in the center of the module in the project window. The module pop-up menu will appear with the following choices. The "Configure" and "Remove" options are only available during project design. The "Run-time" option is only available when the project is running.

Module Pop-up Menu Item	Description
Configure	Access the Serial Output configuration window
Run-time	Access to module's Run-time menu
Remove	Remove the module from the project
About	Display generic module information

SO-5.1 Configuration

Select the "Configure" item of the module pop-up menu to access the configuration display for the Serial Output module.



The image shows a Windows-style dialog box titled "Serial Output #3 Configuration". It contains several sections for configuring serial output parameters:

- Mode:** A dropdown menu currently set to "NRZ-L".
- Data Orientation:** Two radio buttons, "LSB" and "MSB", with "MSB" selected.
- Channel:** Two radio buttons, "A" and "B", with "B" selected.
- Clock:** A section with "Type" (radio buttons for "Internal" and "External", with "Internal" selected) and "Frequency:" (a text box containing "16383").
- Data Format:** Two radio buttons, "True" and "Inverted", with "True" selected.
- Data Encoding:** A group box containing five checkboxes: "CRC", "Reed-Solomen" (checked), "Randomization", "Convolution", and "Pseudo-random Noise". Below these are two text boxes: "Frame length:" (containing "256") and "RS length:" (containing "32"), both followed by the word "bytes".
- Frame size:** A text box containing "256" followed by "bytes".
- Buttons:** "Apply" and "Close" buttons at the bottom.

Parameter	Description
Mode	Select the encoding method of the data stream from NRZ-L , NRZ-M , NRZ-S , BIO-L , BIO-M , or BIO-S .
Clock Type	In this version, only the internal clock is used.
Clock Frequency	Enter the frequency in Hz to transmit data out.
Data Orientation	Select LSB if the data stream is transmitted with the least significant bit first. Select MSB if the data stream is transmitted with the most significant bit first.
Channel	Select channel A or channel B for the operation.
Data Format	Select True if the polarity of the data stream is normal. Select Inverted if the polarity of the data stream is inverted.
Data Encoding	Click the appropriate boxes to enable CRC , Reed-Solomen , Randomization , Convolution or Pseudo-random Noise encoding.
Frame Length	Enter the frame length in bytes before encoding.
RS Length	If Reed-Solomen encoding is enabled, enter the length in bytes of RS data to be stored in the frame.
Frame Size	Enter total number of bytes per frame to be transmitted.

Click on **Apply** button to configure any changes. Click on **Close** to dismiss the display.

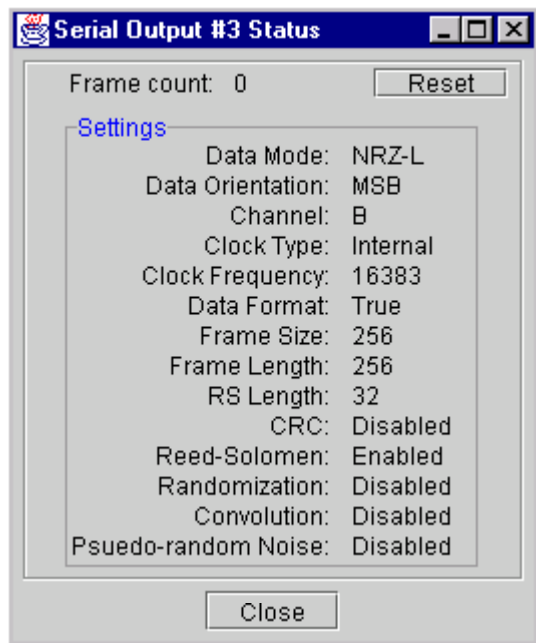
SO-5.2 Run-time

Click on the module pop-up menu "Run-time" option to request the Run-time menu.

Run-time Menu Item	Description
Display Status	Show the status window of the Serial Output module
Display Dump Menu	Show options for the Dump Display
Resume	Restart the module

Pause	Stop the module
-------	-----------------

SO-5.2.1 Display Status



This display shows the current frame counter and the currently configured settings. Please refer to the table in section SO-5.1 for descriptions of the settings.

Click **Reset** to clear the frame counter to zero.

Click **Close** to close the window.

SO-5.2.2 Display Dump Menu

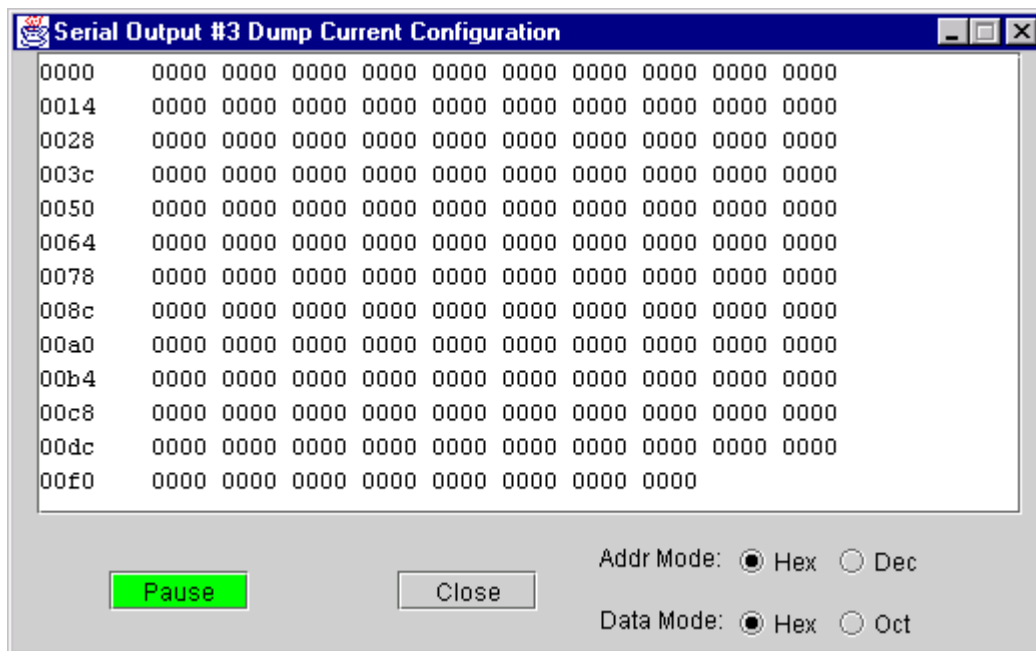
Select the “Display Dump” option to view the available dump formats.

Display Dump Menu Item	Description
Display Buffer Current Configuration	The data buffer is displayed as configured.
Display Buffer True Format	The data buffer is converted to true format and then displayed.

SO-5.2.2.1 Display Buffer Current Configuration

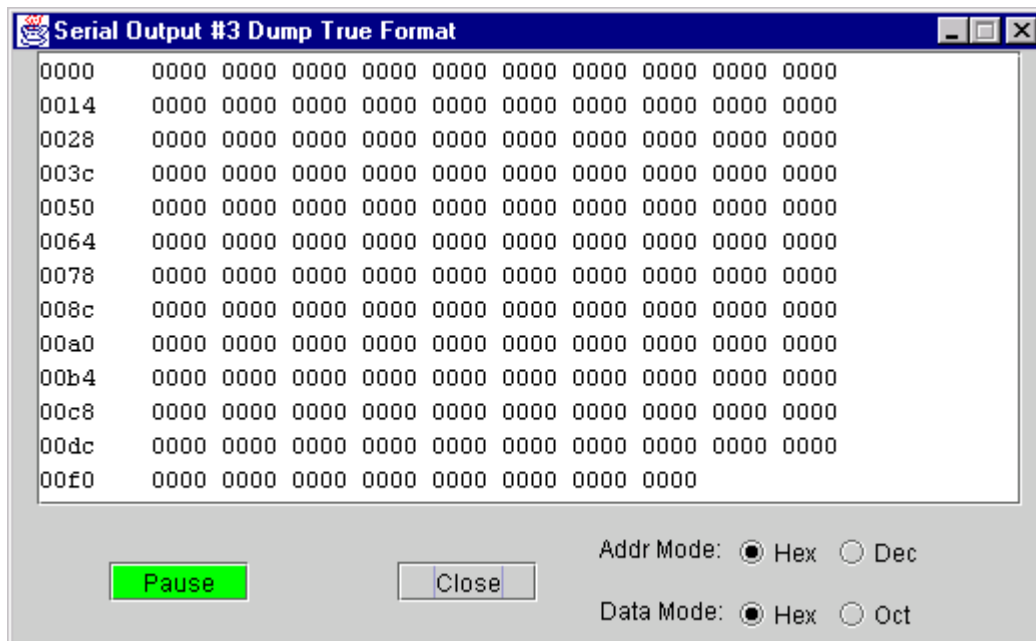
When this option is selected, the output data buffer is displayed as configured. This display has the following standard dump buttons.

Buttons	Description
Addr Mode	Select Hex to display the memory address in hexadecimal format Select Dec to display the memory address in decimal format
Data Mode	Select Hex to display data in hexadecimal format Select Oct option to display data in octal format
Pause	Freeze the data window contents. Pause button is renamed Cont .
Cont	Resume updating the data window contents. Cont button is renamed Pause .
Close	Close the window



SO-5.2.2.2 Display Buffer True Format

When this option is selected the output data buffer is displayed in a true format. If necessary, the data is converted to NRZ-L mode, with MSB orientation and normal polarity. It has the same button controls as described in the previous section.



SO-5.2.3 Resume

After an individual module has been stopped, select “Resume” from the Run-time menu to restart the module. The color around the module’s border will change from red-striped (indicates stopped state) to green-striped (indicate run state).

SO-5.2.4 Pause

Select “Pause” from the Run-time menu to temporarily stop the Serial Output module’s processing. The color around the module’s border will change from green-striped (indicates run state) to red-striped (indicates stopped state). The Serial Output module can be re-configured by selecting the “Configure” option of the module pop-up menu. To return to run mode, select “Resume” from the Run-time menu.

SO-5.3 Remove

Select this option to remove the Serial Output module from the project.

SO-5.4 About

Selecting the “About” option from the module pop-up menu produces a display that lists the number of input channels, number of output channels, whether directives are allowed, names of authors and the module’s version number.

SO-6.0 Special Operating Instructions

There are no special operating instructions for this release.

Scenario (SN) Module

SN-1.0 Overview

The Scenario module reads directives from specified scenario files line by line and passes them to the down-linked module for processing. The user interface allows the operator to control and monitor the execution of up to five scenarios at a time. The scenario module may also receive scenario file names from the down-linked module. In addition, any scenario file being processed may start the execution of other scenario files.

SN-2.0 Inputs

SN-2.1 Server/Properties/Property.txt

When the project containing a scenario module is started, the server reads a property.txt file in the server's properties directory to configure several project parameters. One of these parameters, *ConcurrentScenario*, defines how scenario modules will execute nested scenario files and module triggered scenario files.

The default setting for *ConcurrentScenario* is one. When set to one, the scenario module executes nested and external module requested scenario files concurrently. Additional system resources are dynamically allocated and released as these scenarios start and stop execution.

If the setting for *ConcurrentScenario* is zero, both types of non-GUI controlled scenario files are collected in a queue and executed in first-in-first-out (FIFO) order. This method is less taxing on system resources but may not execute scenario files quickly enough in some cases. This mode should be used if there are system resource problems over time or if the execution of scenario files causes degradation of other processing.

SN-2.2 Module Triggered Scenarios

The Scenario module does not technically have any input channels. It is not possible to create an input link to this module. Its lone output channel is actually bi-directional, providing only the down-linked module a way to pass names of scenario files to be executed. Processing specific to the down-linked module may trigger the passing of scenario file names back to the scenario module for immediate execution.

SN-2.3 Scenario File Input

Much of the input to this module is via scenario files, which are read during run-time. There are no naming conventions for scenario files, although embedded spaces are not recommended. Scenario files are expected to be in the scenario directory, which is below the server executable directory, unless a full pathname is specified. Relative pathnames are assumed to start from the scenario directory.

SN-2.3.1 Scenario File Format

The format of these ASCII text files is very simple. Each line is limited to 99 characters. Each line contains one of the following items.

Line	Description
comment line	A semicolon in the first column defines a comment.
blank line	A line containing blanks is treated as a comment line.
<i>SLEEP</i> milliseconds	The scenario module pauses execution of the file for the number of milliseconds specified. When milliseconds are specified as -1, the directive is a SLEEP forever. For a GUI controlled scenario, a sleep forever is equivalent to the pause button being used. For non-GUI controlled scenarios, the SLEEP forever instruction is ignored.
<i>START SCENARIO</i> name	The scenario module starts execution of a nested scenario file. This nested file runs without operator intervention even if the file that started it was operator controlled.
directive	Any line that is not a comment or executed by the scenario module is assumed to be a directive for the linked module. The receiving module performs any validation done on this line. The format for directives is the same as if the operator had entered it in the project directive entry line.

SN-2.3.2 Sample Scenario File

The following 4 lines are a simple example of a scenario file. The first line is a comment. The second line is a directive to the Scenario module to pause for one second. The third line is a directive to the linked module to change the value of the container item named "TransmitMode" to one. The fourth line starts execution of a nested scenario file named OtherScenario.txt.

```
;This is a comment line in a scenario file
SLEEP 1000
set TransmitMode 1
Start scenario D:/Scenario/OtherScenario.txt
```

SN-3.0 Outputs

The Scenario module has a single output channel. It should be linked to input channel 1 of the module to receive the directives.

Channel	Description
1	Scenario module sends the read directives to the linked module.

SN-4.0 Container Items

This module's container items are not accessible via operator directives.

SN-5.0 Displays

To access displays for a module, click in the center of the module in the project window. The following module pop-up menu will appear. There are no configuration screens for the Scenario module. The Run-time option is available only when the project is running. The “Remove” option can be used during project design to remove the module. The “About” option is for the display of the generic module information.

Module Pop-Up Menu Item	Description
Configure	Access Configuration menu for this module
Run-time	Access Run-time menu for this module
Remove	Remove module from the project
About	Display generic module information

SN-5.1 Configure

There are no configuration displays for this module. Refer to section SN-2.1 for information on configuring the scenario execution mode, *ConcurrentScenario*, from the Server/Properties/Property.txt file.


SN-5.2 Run-time

Click on the module pop-up menu “Run-time” option to request the Run-time menu.

Run-time Menu Item	Description
Control	Request Control Scenario Display

SN-5.2.1 Scenario Control Display

Select “Control” from the Run-time menu to show the Scenario Control Display. Up to five scenario files may be controlled and monitored with this display. The fields associated with each file are described in the following table. Click the **Close** button to dismiss the display.

Field	Description
Filename	Enter the full or relative pathname for the scenario file in this field.
File browser 	Click on this button to the right of the filename field to invoke file browsing to select a file.
Start/Stop Button	This button's title changes to Start or Stop as appropriate. To start processing an entered file, click its Start button. To stop an executing file, click its Stop button.
Pause/Resume Button	This button's title changes to Pause or Resume as appropriate. To temporarily stop the processing of a scenario file, click its Pause button. To resume a file after pausing, click its Resume button.
Line No.	This field shows the line position within the file.
Cur. Line	This field shows the text of the most recently executed line.
Status	This field shows “Running”, “Paused”, or “Finished”.

The screenshot shows a window titled "Scenario #3 Control". It contains five vertically stacked panels, each for a different scenario (Scenario 1 through Scenario 5). Each panel has the following fields and controls:

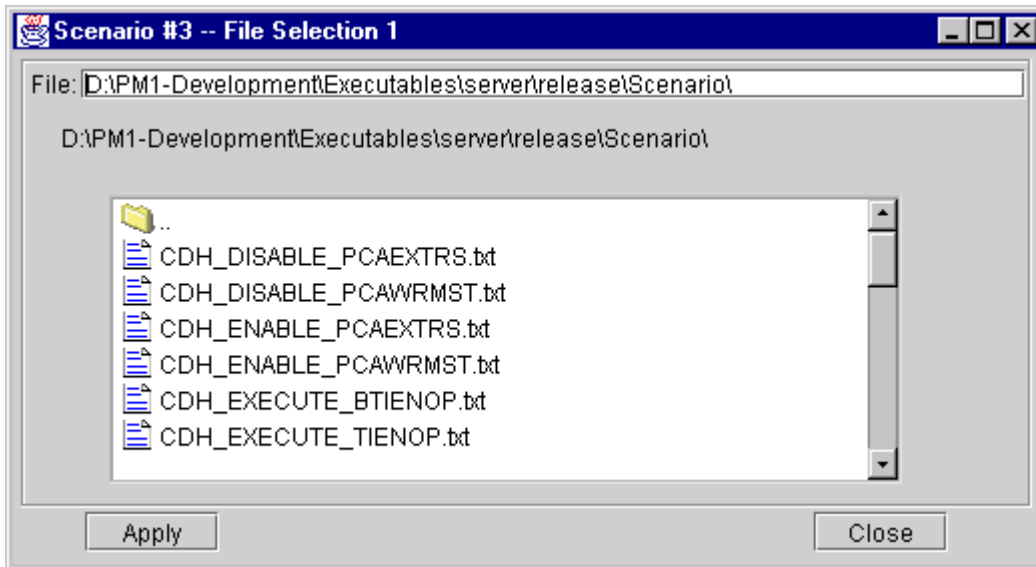
- Filename:** A text input field with a browse button (three dots) to its right.
- Line No.:** A text input field.
- Status:** A label showing the status, currently "Finished" in red text.
- Cur. Line:** A text input field.
- Start:** A button to start the scenario.
- Pause:** A button to pause the scenario.

At the bottom of the window is a **Close** button.

SN-5.2.2 Scenario File Browser

When any of the file browser buttons is selected from the Scenario Control Display, a file selection display similar to the next screen will be displayed. The current search directory will be shown in the File field. Double click on the appropriate folder icons to navigate to the desired directory. Double click on the ".." folder to go up the directory structure. Double click on a named folder to display its contents. Double click to select a scenario file name. The file name should then appear in the File field. Use the **Apply** button to transfer the selected file name to the control display. Use the **Close** button to dismiss the

display without selecting a file. When a file is selected in this manner, its directory then becomes the current search directory for the next file browse action.



Limitations:

The file browser cannot navigate to a disk drive other than the drive where the server software is installed.

The file browser cannot navigate to directories with embedded spaces in their names.

The file browser cannot display more than 1400 characters in its file selection list. If this limit is exceeded, a partial file list is displayed, and an error event message will be logged. The user may manually enter any filename not shown in the list in the file field. The user should move some of the scenario files to other directories if this is a recurring problem.

SN-5.3 About

Selecting the “About” option from the Scenario module pop-up menu produces a display that lists the module’s number of input and output channels, whether operator directives are allowed, names of authors, and the version number.

SN-6.0 Special Operating Instructions

SN-6.1 Built-in Delays in Scenario Files

Because of the fast processing of scenario files (e.g. 300 directives or more per second), the GUI Event Message window may become jammed by the volume of event messages produced in a very short time. Consequently, other displays may also be “hung up” by this undesirable effect. A proper remedy is under investigation. In the meantime it is suggested

that delays be built into the scenario files so that only 20 directives are executed each second.

```
; Sample scenario file
Set MOD_SS_DRNADSTEP 1
SET CEF_NR_ETRQ_1 2
SET AS2_TS_DETECTOR 3
SLEEP 1000
SET AMR_NR_MWASPEED 65
SET AMR_SS_BITPKT1 1
SET AMR_SS_BITPKT4 1
SLEEP 125
SET EPS_SS_MAINBUSVR 0XFF
sleep 5000
SETBUFFER TLMPACKET0140 20 BYTE 0XA 10 012
```

SN-6.2 Stopping Nested or Triggered Scenarios

Even though the user does not have control over the execution of scenarios started internally, it is possible to stop them without shutting down the simulator. To stop all ongoing scenario files of all types, click on the Project's Run menu and select the "Stop" option. The user should then immediately click on the "Run" option to restart the entire project. Since all of the modules will be stopped briefly, there could be dropouts in data and other consequences. The scenario module does not automatically restart any scenario files when restarted after a project stop.

Transmit File (TxFile) Module

TxFile-1.0 Overview

The Transmit File (TxFile) module reads in data from a file according to user-defined parameters and sends the data out unformatted. It operates in either manual mode, where data blocks are loaded and sent out one at a time under user control, or automatic mode, where data blocks are loaded and sent out under user-defined parameters. TxFile can process a file in normal order or reversed order (the first byte of the file is read and sent out as last byte, the last byte of the file is read and sent out as first byte). If the data file was created by the Log Module and has log headers, it is possible to retransmit the file with the same relative timing between blocks.

TxFile-2.0 Inputs

None.

TxFile-3.0 Outputs

Channel	Description
1	Data read from file

TxFile-4.0 Container Items

This module accepts operator directives and is capable of receiving directives from a Scenario module. Use the Set and Get directives to access items with a fixed, integer, float, or string types. Use the SetBuffer and GetBuffer directives on buffer types. Although names in the following tables contain upper and lower case, directive lines are not case sensitive.

Name	Type	Description
TxFileName	String	Pathname of file to send
TxFileStart	Integer	The position of the first block begin to read
TxFileSize	Fixed	Size of file in bytes
TxFilePosition	Integer	Current file pointer position
TxFileTransmitCount	Integer	Number of blocks transmitted
TxFileTransmitBuffer	Buffer	Most recent buffer loaded from file
TxFileBlockSize	Integer	Size of block to load and then transmit
TxFileReversed	Integer	Reversed order flag
TxFileMode	Integer	File Read Modes: (1) Offset (2) Log file (playback a logged file with header) (3) Sync (4) Length Note: (3) & (4) not implemented yet
TxFileModeOffset	Integer	Offset from the start position of previous block
TxFileLogTiming	Integer	Use log file timing instead of the interval
TxFileAuto	Integer	Automatic or manual mode flag

TxFileLoad	Integer	Flag to load a block
TxFileFileLoopFlag	Integer	Flag for number of times a whole file to be read and sent out
TxFileLoopCount	Integer	Number of times a whole file to be read and sent out. Note: a whole file would be read and sent out indefinite times if the counter is set to be equal or less than 0.
TxFileBlockFlag	Integer	Flag for number of blocks to be read and sent out
TxFileReadCount	Integer	Number of blocks to be read
TxFileSendCount	Integer	Number of times each block to be sent out
TxFileInterval	Float	Interval between two blocks be sent out in millisecond
TxFileSend	Integer	Flag to start transmission
TxFileContinueSend	Integer	Flag to continuously transmit
TxFileStop	Integer	Flag to stop transmission

TxFile-5.0 Displays

To access the displays for this module, first click on the center of the module in the project window. The following items will appear in a pop-up menu.

Module Pop-Up Menu Item	Description
Configure	Access the configuration menu for the module
Run-time	Access the Run-time menu for the module
Remove	Remove module from the project
About	Display generic module information

TxFile-5.1 Configuration Displays

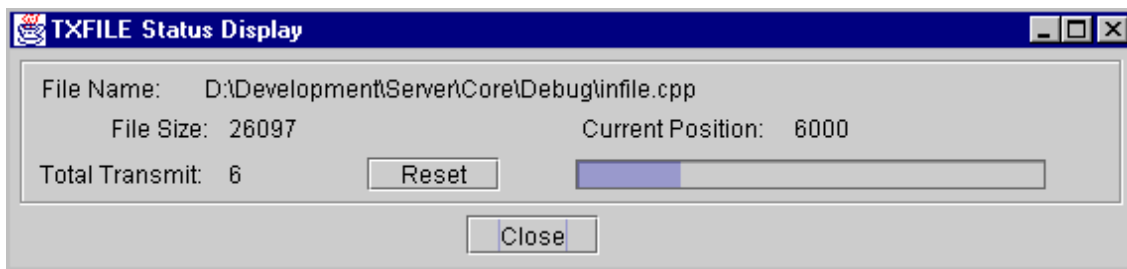
There are no configuration displays for this module.

TxFile-5.2 Run-time Displays

Run-time Menu Item	Description
Display Status	Display TxFile module status
Display Transmit Buffer	Display current block for transmission
Send From File	Control TxFile module processing

TxFile-5.2.1 Status Display

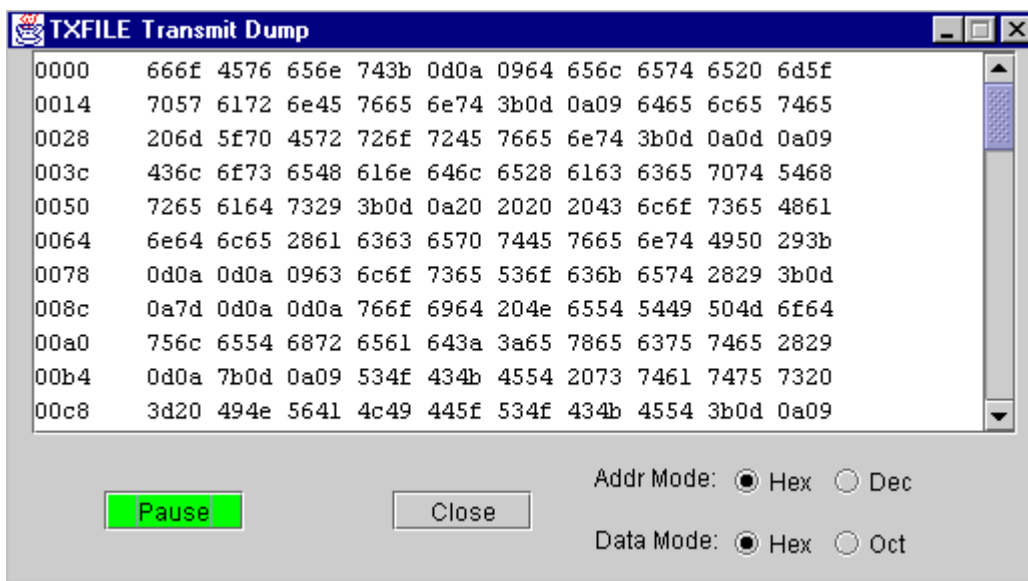
The status display shows the current filename, the size of the file, current file pointer position, and the total number of blocks transmitted.



Status Display Field	Description
File Name	Pathname of the file being transmitted
File Size	Size (in bytes) of the file being transmitted
Current Position	Current byte position in file
Total Transmit	Total number of blocks transmitted
Reset	Click to clear the Total Transmit count

TxFile-5.2.2 Transmit Buffer Display

The transmit buffer display shows the contents of the currently loaded block.



The address field of the dump display may be toggled between hexadecimal and decimal display formats. The data portion may be toggled between hexadecimal and octal formats. The screen contents may be "frozen" using the **Pause** button. Paused data may be "unfrozen" with the **Cont** button.

TxFile-5.2.3 Send From File

The send from file display is the main operations display. This display allows the user to specify data files, specify read mode parameters, specify output mode parameters and control the data transmission.

This is the initial Send from File Display before any parameters have been set. The default interval (for automatic transmission) is 2000 milliseconds (2 seconds) between blocks. The default read mode is Offset. The default output mode is Manual.

File Info	Description
Filename	Pathname of the file to transmit – can be either relative or absolute pathname (leading or trailing white space is allowed, but not between).
Start pos	Starting position (in bytes) within the file of the first block to send.
Blocksize	Size of block to read (in bytes).
Reverse Order	If set, the file is transmitted in reversed order (the first bit of file is transmitted as the last bit, last bit of file is transmitted as first bit).
Read Mode	Description
Offset button	Click to select Offset read mode
Offset field	Increment (in bytes) between the start of consecutive blocks. Should normally be the same as the block size. If zero, the same block would be read and sent out repeatedly.
Sync	(Not yet implemented) Sync mode -- Look for a sync pattern in the file as given by the bit size and the bit pattern and send out the number of bytes given by block size starting with and including the sync pattern.
Length	(Not yet implemented) Length mode -- Look for a length value in the file as given by the bit offset after the end of the previous block. Pick up the number of bits given, add the adjustment, and use that as

	the length of the block to send.
Log file	Specify a Log Module file with log headers
Use log file timing	Use relative timing from the log headers instead of the Interval to transmit data blocks
Output Mode	Description
Manual	(Manual mode) Data blocks are loaded and sent out one at a time under user control
Auto-Complete File	(Automatic mode) Transmit a whole file the specified number of Cycles .
Cycles	To transmit the file a fixed number of times, set Cycles to a nonzero value (default value is 1). To transmit the file an indefinite number of times, set Cycles to zero. Note: If the "Offset field" is set to zero, the end of file is never reached and the same block will be transmitted repeatedly until stopped.
Auto-Blocks	(Automatic mode) Transmit a portion of a file, indicated by setting Blocks Read and Blocks Sent (both are 1 by default).
Blocks Read	Number of blocks to read
Blocks Sent	Number of times each read block is sent out. Note: If this field is less than or equal to 0, the blocks read are sent out repeatedly until stopped.
Interval	Interval between block transmission (in milliseconds).
Operation	Description
Load	(Manual mode only) Loads the next block from the file.
Send	Manual mode: Sends the currently loaded block one time. Automatic modes: Starts the specified automatic transmission.
Continuously	(Auto-Blocks mode only) Pressing the Send button sends out the current block. Pressing the Continuously button will make the next block the current block and send it out.
Stop	(Automatic modes only) Stop sending blocks.
Apply	Configuration values are made effective when and only when this button is pressed.
Close	Close this window.

TxFile-5.2.3.1 File Types

Any type of data file may be used with varying degrees of success. Depending on the type of file, different modes of operation should be used. Currently this module only recognizes two basic file types.

Raw data: Any file that contains data bytes only. It contains no additional bytes preceding or following the data bytes. An example of a raw data file is any log file created by the Log Module without the log header option. Raw data files may be received from many other sources.

Log file: Any file created by the SIMSS Log Module with the log header option

enabled. The log header bytes contain data length and log time information.

A file may have fixed or variable length data.

Fixed data: Every data entry in the file is the same size. When the Log Module creates fixed sized files, some entries may be truncated and others may be padded with zero bytes.

Variable data: Data entries in the file may vary in size. This is usually the most flexible and efficient way to log data.

The following table summarizes read and transmission modes for the different file types and provides a map to applicable examples in the following sections.

File Type	Data Size	Read Modes	Transmit Modes	Examples
Raw data	Fixed	Offset	Manual mode	Example 1
Raw data	Fixed	Offset	Auto-Complete File	Example 2
Raw data	Fixed	Offset	Auto-Blocks	Example 3
Raw data	Varying	Offset (?)	Manual (?), Auto (?)	None apply, see note
Log file	Fixed or Varying	Log file	Manual mode	Example 1
Log file	Fixed or Varying	Log file	Auto-Complete File	Example 2
Log file	Fixed or Varying	Log file	Use Log file timing	Example 4

Note Since the Sync and Length read modes are not yet implemented, TxFile can not properly process raw files with varying size data. Every data byte can be read and transmitted using modes valid for fixed raw files, but the timing and grouping of the data may not be valid for the receiving system. These files should be converted to fixed data size files. When varying length data is recorded with the Log module for later TxFile playback, the log header option must be enabled.

The next four sections provide examples for using the different output modes. The steps given in each example are the minimum steps required. Review the parameters description table at the beginning of section 5.2.3 for more information.

Section 5.2.3.2	Example 1	Manual Mode Transmission
Section 5.2.3.3	Example 2	Auto-Complete File Transmission
Section 5.2.3.4	Example 3	Auto-Blocks Transmission
Section 5.2.3.5	Example 4	Log File Timing Transmission

TxFile-5.2.3.2 Example 1 Manual Mode Transmission

Step	Manual Mode Transmission Description
1	Enter the file name in the Filename field.
2	Select Manual Output Mode if it is not already on. If the Output Modes are not available for selection, click to select the Offset File Read Mode first.
3	For raw data files, click to set Offset File Read Mode and enter the fixed data size in bytes in the Blocksize and Offset fields. For log files, click to set the Log file option.
4	Click Apply button and note any error messages in the event message log. If necessary correct the file name and repeat this step until there are no errors.
5	Click Load button to read in the next entry of the file.
6	Click Send button to transmit the loaded entry one time.
	Repeat steps 5 and 6 as often as needed.

The following screen shows TxFile configured for manual output mode using a raw data file with entries of 256 bytes. Steps 1 through 4 (Apply) have been done. Steps 5 and 6 must be executed to transmit data.

Txfile #0 Transmit

File Information
 Filename: D:\command.log
 Start pos: 0 Blocksize: 256 ☐ Reverse order

File Read Mode
☒ Offset Offset: 256
☐ Sync Size: 0 Pattern: 0
☐ Length Bit pos: 0 No. of bits: 0 Adjustment: 0
☐ Log file ☐ Use log file timing

Output Mode
☒ Manual
☐ Auto-Complete File Cycles: 1
☐ Auto-Blocks Blocks Read: 1 Blocks Sent: 1
 Interval: 2000 msec

Operation

TxFile-5.2.3.3 Example 2 Auto-Complete File Transmission

Step	Auto-Complete File Transmission Description
1	Enter the file name in the Filename field.
2	Select Auto-Complete File in Output Mode region. If the Output Modes are not available for selection, click to select the Offset File Read Mode first.
3	For raw data files, select Offset File Read Mode and enter the fixed size in bytes in the Blocksize and Offset fields. For log files, click to set the Log file option.
4	Enter the desired timing between blocks in the Interval field. (1000 = 1 second)
5	For raw data files only, the Cycles field may be modified to specify the number of times to transmit the file. Set Cycles to zero for an indefinite number of times.
6	Click Apply button and note any error messages in the event message log. If necessary correct the file name and repeat this step until there are no errors.
7	Click Send button to start the automatic transmission. Transmission will stop when the file has been transmitted the specified number of cycles. Transmission does not automatically stop for raw files when the Offset field or the Cycles field is set to zero. Log files are only transmitted one time.
8	Click Stop button to stop the automatic transmission at any time.

The following screen shows TxFile configured for Auto-Complete File output mode using a raw data file with entries of 256 bytes. The entire file will be transmitted 3 times with 5 seconds between blocks. Steps 1 through 6 (Apply) have been done. A single click on the **Send** button will start the transmission.

Txfile #0 Transmit

File Information
 Filename:
 Start pos: Blocksize: ☐ Reverse order

File Read Mode
☒ Offset Offset:
☐ Sync Size: Pattern:
☐ Length Bit pos: No. of bits: Adjustment:
☐ Log file ☐ Use log file timing

Output Mode
☐ Manual
☒ Auto-Complete File Cycles:
☐ Auto-Blocks Blocks Read: Blocks Sent:
 Interval: msec

Operation

TxFile-5.2.3.4 Example 3 Auto-Blocks Transmission (Raw Fixed Data Files Only)

Step	Auto-Blocks Transmission (Raw Fixed Data Files Only)
1	Enter the file name in the Filename field.
2	Select Auto-Blocks in the Output Mode region. If the Output Modes are not available for selection, click to select the Offset File Read Mode first.
3	Set Offset File Read Mode if not already set and enter the fixed data size in bytes in the Blocksize and Offset fields.
4	Enter the desired timing between blocks in the Interval field. (1000 = one second)
5	Enter the number of blocks to read in the Blocks Read field.
6	Enter the number of times to transmit each block in the Blocks Sent field. If this field is set to zero, the same block will be sent until the Continuously button is used to force loading of the next block.
7	Click Apply and note any error messages in the event message log. If necessary correct the file name and repeat this step until there are no errors.
8	Click Send to start the automatic transmission. If Blocks Read specifies a finite value, the transmission will stop after the specified blocks have been sent the specified number of times.
9	If the Blocks Read field was set to zero, click on Continuously button when desired to cause loading and sending of the next block.
10	Click on Stop to stop the automatic transmission.

Txfile #0 Transmit

File Information
 Filename:
 Start pos: Blocksize: ☐ Reverse order

File Read Mode
☒ Offset Offset:
☐ Sync Size: Pattern:
☐ Length Bit pos: No. of bits: Adjustment:
☐ Log file ☐ Use log file timing

Output Mode
☐ Manual
☐ Auto-Complete File Cycles:
☒ Auto-Blocks Blocks Read: Blocks Sent:
 Interval: msec

Operation

The above screen shows TxFile configured for Auto-Blocks output mode using a raw data file with entries of 256 bytes. The first 2 blocks of the file will be transmitted 3 times with 1500 milliseconds between blocks. Steps 1 through 7 (Apply) have been done. A single click on the **Send** button will start the transmission.

TxFile-5.2.3.5 Example 4 Use of Log File Timing (Log Files Only)

Step	Use of Log File Timing (Log Files Only)
1	Enter the log file name in the Filename field.
2	Select Auto-Complete File in Output Mode region. If the Output Modes are not available for selection, click to select the Offset File Read Mode first.
3	Click to select the Log file option.
4	Click to select the Use log file timing option. Relative timing between blocks will be calculated from the time tags in the log headers.
5	Click Apply and note any error messages in the event message log. If necessary correct the file name and repeat this step until there are no errors.
6	Click Send to start the automatic transmission of the file using log file timing. Transmission will stop when the file has been sent one time.
7	Click Stop to halt the automatic transmission before completion.

The following screen shows TxFile configured for Auto-Complete File mode using log file timing. Steps 1 through 5 (Apply) have been done. A single click on the **Send** button will start the transmission.

Txfile #0 Transmit

File Information
 Filename: D:\ad bc cmds.log
 Start pos: 0 Blocksize: 0 ☐ Reverse order

File Read Mode
☐ Offset Offset: 0
☐ Sync Size: 0 Pattern: 0
☐ Length Bit pos: 0 No. of bits: 0 Adjustment: 0
☒ Log file ☒ Use log file timing

Output Mode
☐ Manual
☒ Auto-Complete File Cycles: 1
☐ Auto-Blocks Blocks Read: 1 Blocks Sent: 1
 Interval: 2000 msec

Operation

TxFile-5.3 About Display

Clicking the “About” option of the module pop-up menu requests a display that lists information about the module such as the numbers of input and output channels and whether the module accepts operator directives.

TxFile-6.0 Special Operating Instructions

- It is important to specify the appropriate read mode for the data file type (see TxFile-5.2.3.1 File Types). If a raw data file is read using the Log file mode, data bytes will be interpreted as log header fields and may cause the TxFile module to crash. If a log file is read using the Offset mode, the log header fields will be incorrectly transmitted as part of the data.
- When using the Auto-Complete File and Auto-Blocks Output modes, it is critical to set the Interval field properly. This field is in milliseconds. If a very short interval is used, an entire file may be transmitted multiple times in a brief period. In some configurations, the automatic transmission does not stop without operator intervention. This may overwhelm the resources of the sending system or that of the receiving system.
- There are several limitations when using Log files. When some of the following options are selected, they currently do not work and there are no error event messages.
 - 1) The Auto-Blocks output mode does not work with log files. (If Auto-Blocks is selected with use log file timing, TxFile processes the request as Auto-Complete File with log file timing.)
 - 2) When using the Auto-Complete File output mode with log files, the file is only transmitted once. It does not matter how the Cycles field is set.
 - 3) A starting offset (Start pos) cannot be used with log files. If specified, it will be ignored. The log file will be read from the beginning.
 - 4) Reverse order should not be used with log files.

SIMSS/PM-1 ACRONYMS

APID	Application Identifier
BCH	Bose-Chaudhuri-Hocquenghem
C&DHS	Command and Data Handling System
CADU	Channel Access Data Unit
CCSDS	Consultative Committee on Space Data Systems
CERES	Clouds and the Earth's Radiant Energy System
CLCW	Command Link Control Word
CLTU	Command Link Transmission Unit
COP	Command Operations Procedure
COTS	Commercial, off-the-shelf
CSC	Computer Sciences Corporation
CUC	CCSDS Unsegmented Time Code
EBnet	EOSDIS Backbone Network
EDOS	EOS Data and Operations System
EDU	EDOS Data Unit
EGS	EOS Ground System
EMOS	EOS Mission Operations System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information Systems
EPGS	EOS Polar Ground Stations
ESH	EDOS Service Header
ETS	EOSDIS Test System
FARM	Frame Acceptance and Reporting Mechanism
FTP	File Transfer Protocol
GMH	Ground Message Header
GMT	Greenwich Mean Time
GS	SIMSS Ground Station Module
GUI	Graphical User Interface
ICD	Interface Control Document
IP	Internet Protocol
NT	New Technology
ODB	Operational Database
PC	Personal Computer
PDB	Project Database
PM-1	Afternoon equatorial crossing spacecraft series
SC	SIMSS Spacecraft Module
SIMSS	Scalable Integrated Multimission Simulation Suite
SIMSS/PM-1	SIMSS/PM-1 Simulator
SORD	Spacecraft Operations Requirements Document
TCP	Transmission Control Protocol
TIE	Transponder Interface Electronics
UDP	User Datagram Protocol
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identification